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ABSTRACT

This guide presents a plan for the complete secondary school technology education curriculum approved by the Technology Education Service in Virginia. Intended users are vocational administrators, program designers, guidance counselors, teachers, and students. It presents a curriculum structure for technology education and a chart of technology education programs and course options. Descriptions of these middle/junior high school offerings (courses) are provided: A World of Choice--Careers and You; Introduction to Technology; Exploring Technology; and Industry and Enterprise. Each description includes purpose, grade level, unit of credit, prerequisites, selected course goals, and a task/competency list with corresponding content/concept. Approved high school programs and the individual courses are then described. The approved programs and numbers of course selections are communication technology (2 courses), drawing and design technology (3), electronics technology (2), power and transportation technology (2), principles of technology (2), and production technology (5). The descriptions contain the same components as do those of the middle/junior high school courses. Objectives and standards for the student organization are also provided. Resource lists are provided of guides and resources for the student organization (American Industrial Arts Student Association) and of textbook and teacher resources for the various courses. (YLB)

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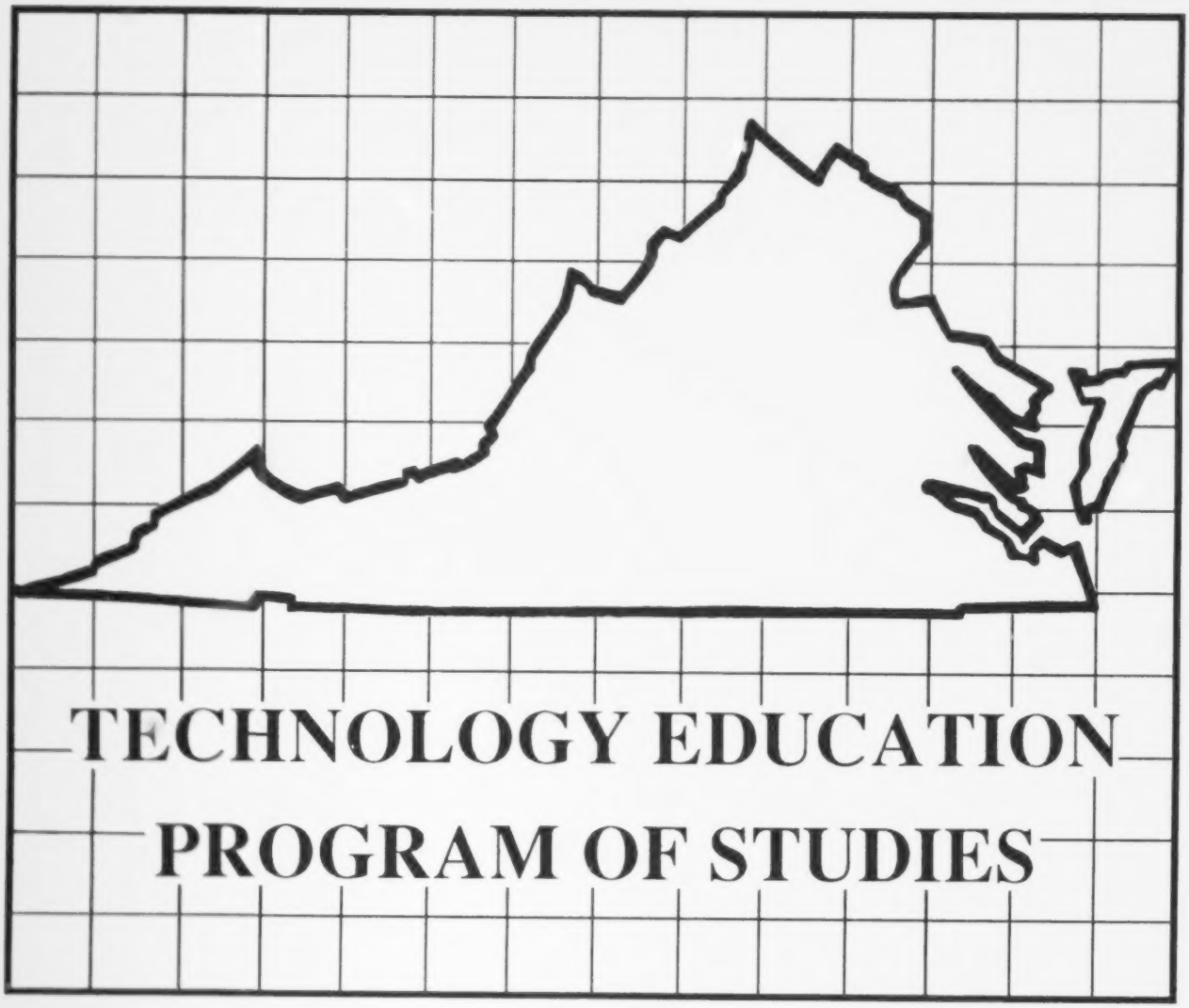

TECHNOLOGY EDUCATION PROGRAM OF STUDIES

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF EDUCATION
VOCATIONAL AND ADULT EDUCATION
RICHMOND, VIRGINIA 23216

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TECHNOLOGY EDUCATION
PROGRAM OF STUDIES

Developed by
Technology Education Service
Department of Education
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Richmond, Virginia 23216

and

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Glen Allen, Virginia 23060

1986

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INTRODUCTION

The Technology Education curriculum has unlimited potential for course and program development. Scores of courses are currently provided, but many more could be offered. Although these possibilities excite the imagination, they also indicate the significance of determining those areas of greatest value for student experience.

Thus, the development of an appropriate or model curriculum requires a critical examination of several underlying questions.

- What is the overall responsibility of Technology Education?
- Which goals identified by Technology Education are appropriate for various grades or school levels?
- Which courses constitute a meaningful curriculum for these goals to be realized?
- What should be the scope and sequence of the toal curriculum?

The answers to these questions have been addressed by a Virginia Technology Education Curriculum Council and are presented in the program materials included in this guide.

The Technology Education Program of Studies presents a plan for the complete secondary school Technology Education Curriculum approved by the Technology Education Service, Virginia Department of Education, and describes the program promoted in Virginia public schools.

Two types of technology education programs, each with individual courses, constitute the complete secondary school curriculum:

.Orientation and Exploration

This program, designed for grades 6 through 9, assists students in making informed and meaningful occupational and educational choices.

.Application and Adaptation

These programs, designed for grades 9 through 12, enable students to understand the technology clusters as preparation for advanced vocational/technical and collegiate programs. As machines and technology advance, this broad technical base is also useful in many occupations.

OVERVIEW OF TECHNOLOGY EDUCATION

Technology

Technology is an extension of the human being. It is our way of reaching out into the world using knowledge and creativity to expand human potential and modify the environment. The scientist typically views technology as the application of science and mathematics for a specific purpose. However, historians, engineers, and technologists tend to define technology as the application of our knowledge, tools, and skills to solve practical problems and extend human capabilities.

Technology Education

Technology education is a comprehensive, action-based educational program concerned with technical means, their evolution, utilization, and significance; with industry, its organization, personnel, systems, techniques, resources, and products and their social and cultural impact.

The Mission

Because technology is a distinctive characteristic of the American culture, it is essential that students gain an insight into and an understanding of the technological nature of this society. Technologies spring from the human abilities to reason, solve problems, create, construct, and use materials imaginatively. Since these abilities form an integral part of our technological culture, they should be developed in all students, regardless of the student's educational goals or occupational pursuits.

The mission of Technology Education is to help students develop an understanding of technology and its dynamics, the opportunities it offers, and its

impact on product and process, markets, organization structures, and people. In summary a study of technology can help students:

- To recognize and explain the importance of technology
- To apply tools, materials, and processes safely and efficiently
- To uncover and develop individual talents
- To apply problem-solving techniques
- To apply skills and knowledge gained in the study of other school subjects
- To apply creative abilities
- To deal with forces that influence the future
- To adjust to the changing environment
- To become a wiser consumer
- To make informed career choices.

The Goals

Through the Technology Education curriculum, students at each educational level will develop specific abilities and attitudes.

1. By using simple tools, materials, and processes, students at the elementary school level will receive learning reinforcement that contributes to personal development and technological awareness.

2. Students at the middle or junior high school level will become aware of employment opportunities and requirements, knowledge that will be useful in making career choices and determining educational programs.

3. The technical adaptability acquired by students at the senior high school level will yield occupational readiness, consumer awareness, and personal enrichment.

4. Students participating in the student organization will development leadership abilities; pride in work well done; and high standards of quality in work, scholarship, and safety.

The Instructional Objectives

Technology Education stresses the following primary objectives:

1. The student will apply knowledge of technological concepts, processes, and systems.

2. The student will apply tools, materials, processes, and technical concepts safely and efficiently.

3. The student will apply skills, creative ability, positive self-concept, and individual potential in technology.

4. The student will solve problems and make decisions involving human and material resources, processes, and technological systems.

CURRICULUM STRUCTURE FOR TECHNOLOGY EDUCATION

Grades 9-12	High School Goal: Application and Adaptation
Grades 6-9	Middle or Junior High School Goal: Orientation and Exploration
Grades K-6	Elementary School Goal: Learning Reinforcement and Technological Awareness

TECHNOLOGY EDUCATION PROGRAMS AND COURSE OPTIONS

PROGRAMS AND COURSE OPTIONS	CODE	SUGGESTED GRADE LEVEL	NO. WEEKS
Orientation & Exploration Program			
Careers & You	8475	6-7	18/36
Introduction to Technology	8481/8482/8483	6-7	9/18/36
Exploring Technology	8464/8461	7-9	18/36
Industry & Enterprise	8463/8462	7-9	18/36
Industrial Occupational Exploration	8473/8472	8-10	18/36
Communication Technology Program			
Communication Technology	8418/1815	9-11	18/36
Graphic Communications	8458	10-12	36
Drawing & Design Technology Program			
Basic Technical Drawing	8434/8435	9-11	18/36
Engineering Drawing	8436	10-12	36
Architectural Drawing	8437	10-12	36
Electronics Technology Program			
Electricity/Electronics I	8417/8416	9-11	18/36
Electricity/Electronics II	8412	10-12	36
Power & Transportation Technology Program			
Power & Transportation Technology	8444/8445	9-11	18/36
Energy & Power	8448	10-12	36
Principles of Technology			
Principles of Technology I	9811	10-12	36
Principles of Technology II	9812	10-12	36
Production Technology Program			
Materials & Processes Technology	8478/8433	9-11	18/36
Construction Technology	8432/8431	10-12	18/36
Manufacturing Technology	8426/8425	10-12	18/36
Metals Technology	8430/8439	10-12	18/36
Woods Technology	8440/8449	10-12	18/36
Special Programs			
Vocational Occupational Exploration-- Disadvantaged	8469	Ungraded	
Vocational Occupational Exploration-- Handicapped	8471	Ungraded	

USING THE PUBLICATION

The Technology Education Program of Studies is designed for the vocational administrator, program designer, guidance counselor, teacher, and student and may be used for a variety of purposes.

- It promotes consistency in program planning, course development, and professional communication.
- It provides information to prospective students and their parents on the requirements and content of each course.
- It provides concise course data to aid in the scheduling of courses for a logical program sequence.
- It contains an up-to-date list of textbooks and resources recommended for each course and for student organization class/laboratory activities
- Each task/competency list may be distributed to students prior to instruction.
- Each task/competency list, with minor modifications, can be used as a documentation form to record individual student achievement.

The publication is designed to be placed in a standard-sized notebook so that individual pages may be duplicated or updated as the need arises.

MIDDLE/JUNIOR HIGH SCHOOL OFFERINGS

GOAL:

ORIENTATION AND EXPLORATION

The goal of the middle or junior high school Technology Education program is to assist students in making informed and meaningful educational and occupational choices.

MIDDLE OR JUNIOR HIGH SCHOOL COURSE OPTIONS
(Grades 6 through 9)

Technology education courses at the middle or junior high school level are exploratory in nature, designed to promote student investigation and examination of broad content areas such as communication, construction, manufacturing, and transportation. Technology education is recommended for all students at this level, regardless of their career goals or education plans. Courses should be designed to lead into programs at senior high school and postsecondary levels.

As a result of the middle or junior high school level experience, all students can begin to develop their innate talents, attitudes, and skills to lead more satisfactory lives in their technological world. Problem solving, career orientation, and learning for tomorrow's adaptive environment are the cornerstones of the technology education program at this level.

Taking industrial arts/technology education will enable the middle or junior high school student:

- To appreciate the scope of contemporary technology
- To use safely the basic tools, machines, materials, and processes associated with technology
- To identify occupations and educational programs in technological career fields, and to study and analyze the materials, products, processes, problems, uses, developments, and contributions of these related career areas
- To experience the organization and management systems of business and industry
- To research, plan, design, construct, and evaluate problems and projects common to technological career fields.

Program Standards

To accomplish its stated purpose, the middle or junior high school program shall meet the following standards:

1. Exploratory Experiences: Orientation and exploration experiences shall be provided in laboratories to develop individual skill and creative ability in the proper use of industrial tools, machines, processes, and products.

2. Occupational Orientation: Occupational information, orientation, and instruction shall be provided, which will assist individuals to discover and develop talents, interests, attitudes, and potential related to industry and technology.

3. Guidance and Counseling: The middle or junior high school program shall provide guidance and counseling for students to assist them in making informed and meaningful choices in selected occupational fields and in making appropriate educational choices.

4. Instructional Time and Grade Level: The program is designed for early secondary, middle, or junior high school students, grades 6 through 9. Each course meets for one period per day.

5. Teacher Qualifications: The teacher shall hold endorsement in Industrial Arts and have collegiate preparation through in-service or preservice education to implement the specific course assigned.

6. Student-Teacher Ratio: Class enrollment should not exceed 20 students per period per teacher.

7. Facilities: The instructional laboratory shall adequately accommodate all students enrolled. (Typically, 25 percent of the school population will be enrolled in technology education at any given time.).

8. Equipment: Laboratory equipment shall be provided for activities appropriate to the course offered.

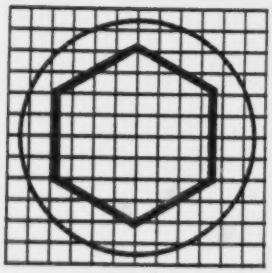
9. Materials and Supplies: Instructional materials and supplies shall be provided to accommodate each student's needs within the context of the course.

Approved Courses

A World of Choice: Careers and You
Introduction to Technology
Exploring Technology
Industry and Enterprise
Industrial Occupational Exploration*
Vocational Occupational Exploration--Disadvantaged*
Vocational Occupational Exploration--Handicapped*

*Contact Technology Education Service, Virginia Department of Education, for information regarding design of these courses.

CAREERS AND YOU



This classroom course is offered to upper elementary, middle, or junior high school students before they begin taking exploratory courses. It introduces students to the 15 career clusters and provides four major emphases: (1) understanding oneself in relationship to work; (2) understanding and simulating the work styles of people (mechanical, conventional, enterprising, social, investigative, and creative); (3) identifying and simulating selected workers; and (4) planning for future exploratory courses or activities.

PURPOSE	CODE	GRADE LEVEL	UNIT OF CREDIT	PREREQUISITES
Orientation and Exploration	8475 (18 or 36 weeks)	6 or 7	1 maximum ½ minimum	None

SELECTED COURSE GOALS

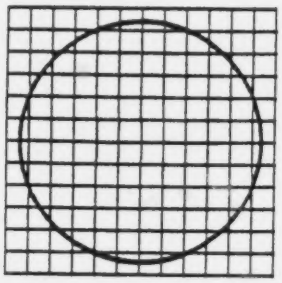
Experiences and activities of this course will enable the student:

1. To understand oneself through analysis of personal interests, abilities, values, and needs relative to personal life roles
2. To become aware of work styles (the ways in which people work) and how they are related to personality characteristics
3. To identify the 15 U.S. Department of Education occupational clusters and their relationship to work styles
4. To synthesize "self," work styles, and cluster interests relative to the selection of career-related experiences, both in and out of school.

A WORLD OF CHOICE: CAREERS AND YOU

CONTENT/CONCEPT

1.	Understanding Personal Interests and Abilities	1.1	Display positive attitudes toward self by listing personal attributes and successfully completing representative mode activities
		1.2	List own unique characteristics and cite those social, economic, educational, and cultural forces which have been influential in one's development
2.	Using Modes to Describe Work	2.1	List and describe the six work modes, including individually perceived assets and liabilities of each
		2.2	List occupations and activities which typify each of the six ways of working
		2.3	Identify the degree to which each work mode is present in a given occupational task
		2.4	Identify those factors which have been influential in the changing emphasis of various work modes within a given occupation
3.	Relating Clusters to Work Modes	3.1	Exhibit an understanding of the concept of clustering by listing and describing the 15 occupational clusters
		3.2	Identify the prevalent cluster associated with a particular learning activity
		3.3	Identify occupations associated with a specific activity
		3.4	List a range of representative occupations which typify each cluster
		3.5	List job families found in each cluster
		3.6	Recognize the presence of work modes within a given cluster by listing examples of occupations typifying each
4.	Selecting Career-Related Experiences	4.1	Identify exploratory courses, clubs, and activities outside of school which offer try-out experiences relative to preferred modes or clusters
		4.2	List occupations and careers which are congruent with individual personality characteristics
		4.3	Describe opportunities to be "creative," "persuasive," or "investigative" while still in school

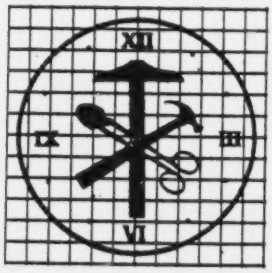


INTRODUCTION TO TECHNOLOGY

The description, goals, and task list for this course are currently being developed. This information will be distributed at a later date.

PURPOSE	CODE	GRADE LEVEL	UNIT OF CREDIT	PREREQUISITES
Orientation and Exploration	8481 (9 weeks) 8482 (18 weeks) 8483 (36 weeks)	6 or 7	1 maximum ½ minimum	None

SELECTED COURSE GOALS



EXPLORING TECHNOLOGY

Students make projects that copy models of significant inventions which have advanced society and the work people do. Basic study units include tools and machines, power and energy, transportation, communication, manufacturing, construction, or societal concerns.

PURPOSE	CODE	GRADE LEVEL	UNIT OF CREDIT	PREREQUISITES
Orientation and Exploration	8461 (36 weeks) 8464 (18 weeks)	6, 7, 8, or 9	1 maximum ½ minimum	None

SELECTED COURSE GOALS

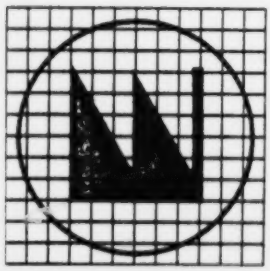
Experiences and activities of this course will enable the student:

1. To recall the importance of history in the development of technology
2. To identify in oral discussion or writing the application of tools, machines, and materials in cultural development
3. To identify resources for obtaining occupational information
4. To locate and use resources on technology-related topics
5. To construct a scale model, displaying craft and tool skills
6. To relate how technology can solve a problem while creating other problems
7. To recognize that all jobs are important and that work has self-gratifying value.

EXPLORING TECHNOLOGY

	CONTENT/CONCEPT		TASK/COMPETENCIES
1.	Introduction	1.1	Recall the importance of history in the development of technology
		1.2	Describe purpose of the anthropological approach to the study of technology
		1.3	Participate in the organized personnel system to manage class and laboratory activities
2.	Area Identification	2.1	Identify potential major areas of study for an anthropological unit
		2.2	Describe the criteria for the selection of a technological area of study
		2.3	Select a technological area of study
3.	Subtopic Identification	3.1	List possible subtopics under a selected technological area of study
		3.2	Identify criteria for the selection of an area subtopic
		3.3	Select a subtopic to study
		3.4	List standards for student expectation levels
		3.5	Identify available resources, tools, and materials for unit instructional outcomes
4.	Construction Phase	4.1	Demonstrate project planning procedures
		4.2	Demonstrate skill in preparing working drawings
		4.3	Select and use proper tools and appropriate materials
		4.4	Assemble a unit model and apply desired finishes
		4.5	Prepare a written report on technological subtopic
		4.6	Construct display for unit model
5.	Seminar Phase	5.1	Organize and prepare an oral seminar report on a subtopic
		5.2	Demonstrate how to conduct a progress seminar, using an established format
		5.3	Describe the effects technology has had on people and society
6.	In-Class Student Association (AIASA)	6.1	Select community resources for technological information
		6.2	Plan, organize, and carry out worthy group activities and projects to improve or serve the school
		6.3	Operate an enterprise with other students
		6.4	Participate with other students in competitive events

NOTE: Task/competencies 2.3 through 5.3 are repeated as students identify and study these areas of technology in the 18-week course: Tools and Machines, Communications and Transportation, and Power and Energy. The following additional areas of technology are studied in the 36-week course: Manufacturing and Construction, and Societal Concerns and their Technology Solutions.



INDUSTRY AND ENTERPRISE

Students construct group projects to learn about two major types of industries: (1) the processing/project industry, which converts raw materials into more useful forms; and (2) the production industry, which uses the assembly line. Students organize and run their own industry company. The products are made for personal use or for sale.

PURPOSE	CODE	GRADE LEVEL	UNIT OF CREDIT	PREREQUISITES
Orientation and Exploration	8462 (36 weeks) 8463 (18 weeks)	7, 8, or 9	1 maximum ½ minimum	None

SELECTED COURSE GOALS

Experiences and activities of this course will enable the student:

1. To identify the procedures for processing a selected raw material into a more useful form
2. To identify the management practices necessary for a project-type industry contract
3. To identify the job entrance requirements for five selected occupations
4. To exhibit basic knowledge of career opportunities in the selected industry
5. To use a managed production system to produce a product or project
6. To perform skills in several areas of the production industry
7. To demonstrate techniques for securing a job
8. To describe the safety measures necessary in a production industry
9. To relate the necessity of selling, distributing, and servicing an industrial product
10. To plan wisely before producing goods and services
11. To describe the value of a free enterprise system.

INDUSTRY AND ENTERPRISE

CONTENT/CONCEPT		TASK/COMPETENCIES
1. Introducing the Processing and Project Industries	1.1	Describe the group process/project approach to the study of contemporary industry
	1.2	Participate in an organized personnel system to manage class and laboratory activities
2. Selecting a Process or Project Industry	2.1	Describe process and project-type industries
	2.2	Establish criteria for industry selection
	2.3	Select a contemporary industry to study
	2.4	Select community resources for process/project industry information
3. Organizing Personnel into a Management System	3.1	List position titles for personnel organization and describe duties
	3.2	Construct organization charts
	3.3	Select roles to be played in the study of a contemporary industry
	3.4	Role play occupations in a selected contemporary industry
4. Constructing a Display or Exhibit of Industry	4.1	Complete preliminary project planning
	4.2	Prepare working drawings
	4.3	Select and use appropriate tools and machines
	4.4	Assemble industry displays
5. Communicating Information Through Seminars, Reports, and Displays	5.1	Prepare written reports to present orally during progress and final seminars
	5.2	Assemble a group publication about an industry studied
	5.3	Prepare a public exhibit of effects contemporary industry has had on people and societies
	5.4	Describe the effects that contemporary industry has had on people and societies
	5.5	Follow rules for participation in competitive events
6. Introducing Line-Production Industries	6.1	Describe the line-production approach to the study of contemporary industry
	6.2	Participate in the selection of officers to manage class and enterprise production
7. Determining Product for Production	7.1	Establish criteria for the selection of a product
	7.2	Select product for line production
8. Managing the Enterprise and Personnel	8.1	Establish an enterprise
	8.2	Identify personnel organization charts for an enterprise
	8.3	Apply for personnel positions in this line-production industry
	8.4	Participate as an employee in a line-production industry
	8.5	Plan for the line-production of a product
9. Engineering and Producing the Product	9.1	Design a line-production product
	9.2	Tool up for the line production of a product
	9.3	Produce line-production products
	9.4	Liquidate an enterprise
10. Presenting Information through Seminars, Reports, and Displays	10.1	Prepare written and oral presentations on line-production activities
	10.2	Assemble a display on line-production activities
	10.3	Compile report of line-production company
	10.4	Describe the effects that line-production industries have had on people and societies
	10.5	Participate with other students in competitive events

HIGH SCHOOL PROGRAMS

GOAL:

APPLICATION AND ADAPTATION

The goal of the high school Technology Education program is to prepare students for collegiate and/or advanced vocational/ technical programs and to equip them with universally transferable technological skills.

HIGH SCHOOL PROGRAM OPTIONS
(Grades 9 through 12)

Senior high school technology education programs are technical in nature and are designed to provide students with an in-depth foundation for career preparation at the secondary or postsecondary level. Students will gain an adaptability leading to consumer awareness, personal enrichment, and occupational readiness. Students pursuing engineering and scientific careers in colleges or universities will gain much from electing one of the courses or program options. Students wishing to develop transferable skills or increased adaptability and diversification for employment, life, or further education will benefit from one of the programs containing a sequence of two or more courses. The high school programs complement the middle or junior high school curriculum and offer sequential courses which build on previously learned content without repetition.

Taking a technology education program or course will enable the student:

- To experience the practical application of basic scientific and mathematical principles
- To make decisions regarding postsecondary technology careers, engineering programs, or service-related fields
- To make decisions with regard to advanced vocational education programs

  To gain an in-depth understanding of and appreciation for technology in our society and culture
- To develop basic skills in the proper use of tools, machines, materials, and processes
- To solve problems involving the tools, machines, materials, processes, products, and services of industry and technology.

To accomplish their purpose, high school technology education programs meet the following standards:

1. Exploration of Industrial Practices: Experiences in laboratories will develop individual skills and creative abilities in the proper use of industrial tools, machines, materials, processes, and products.

2. Preparation for Advanced Training: Experiences and instruction in laboratories will prepare individuals for entry into advanced occupational or technical education programs.

3. Occupational Information: Occupational information, observations, and instruction should assist individuals to discover and develop talents, interests, attitudes, and potential related to industry and technology.

4. Guidance and Counseling: Vocational guidance and counseling should assist students in making informed and meaningful career choices and in arranging for placement in occupational programs.

5. Co-Curricular Student Organization: American Industrial Arts Student Association (AIASA) activities shall be provided as an active and integral part of the program.

6. Teacher Qualifications: The teacher shall hold endorsement in Industrial Arts and have collegiate preparation through in-service or preservice education to implement the specific program assigned.

7. Appropriate Teaching Load: The student-teacher ratio should not exceed 20 to 1.

8. Facilities: All instructional laboratories, equipment, and tools shall be adequate for safe, orderly, and effective instruction.

9. Equipment: Laboratory equipment shall be compatible with the activities of the course.

10. Instructional Supplies: Consumable instructional supplies shall be provided to accommodate adequately each student's needs within the scope of the course.

11. Appropriate Instructional Time and Level: Instructional time shall equal 36 weeks, one period per day, or 180 class hours. Offerings are provided at the high school level, grades 9 through 12, excluding junior high school.

12. Program Identification: A technology education program is defined as a program consisting of two years (300 hours) of instruction in a sequence of approved course options above the eighth grade.

13. Program Completer: A completer is defined as a student satisfactorily completing two years (300 hours) of instruction in an approved technology education program above the eighth grade level.

Approved Programs and Number of Course Selections

1.	Communication Technology Program	2 courses
2.	Drawing and Design Technology Program	3 courses
3.	Electronics Technology Program	2 courses
4.	Power and Transportation Technology Program	2 courses
5.	Principles of Technology Program	2 courses
6.	Production Technology Program	5 courses

Approved programs and the individual courses associated with each are described on the following pages. Many beginning courses are approved as either 18-week or 36-week offerings. The tasks/competencies required for an 18-week course are denoted by an S on the task list for the 36-week course.

COMMUNICATION TECHNOLOGY PROGRAM

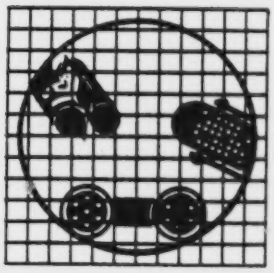
Program Overview

Communication Technology is a high school program consisting of at least 2 classroom/laboratory courses (300 hours of instruction). The program offers the following courses or options:

Communication Technology 8415
Graphic Communications 8458

Instruction enables students to develop competencies in the areas of communications and media, resulting in occupational readiness useful to the future craftsperson, technician, technologist, or consumer.

Program completers are prepared with competencies that build a long-range foundation of technical application and adaptation useful for immediate employment or articulation with advanced occupational preparation in trade and industrial, community college, or university programs.



COMMUNICATION TECHNOLOGY

Students study visual and telecommunication systems, processes, and organizations. Learning experiences include the study of numerous technical developments such as radio, television, offset printing, and photography. Basic technical skills are developed in drafting, graphics, photography, and telecommunications.

PURPOSE	CODE	GRADE LEVEL	UNIT OF CREDIT	PREREQUISITES
Application and Adaptation	8418 (18 weeks) 8415 (36 weeks)	9, 10, or 11	1 maximum ½ minimum	None

SELECTED COURSE GOALS

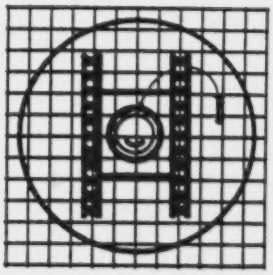
Experiences and activities of this course will enable the student:

1. To recognize basic reproduction processes used in industrial applications of visual communications
2. To use properly the nomenclature associated with visual and telecommunication systems
3. To assess abilities and interests as they relate to careers in communication technology
4. To explain the need for a systematic and safe procedure for setting up experimental circuits and servicing equipment
5. To demonstrate the interrelationship of drafting, graphic arts, photography, and telecommunications
6. To produce copies, using image reproduction processes generally found in business and industry
7. To demonstrate effective means of conveying an idea, using presentation materials
8. To produce drawings capable of being used to produce a product, following standardized procedures
9. To present critically the merits and weaknesses of an existing industrial design
10. To exhibit insight into the application of technology to problems of electronic design and servicing
11. To describe the importance of following regulations in the installation of electrical components.

COMMUNICATION TECHNOLOGY

CONTENT/CONCEPT		TASK/COMPETENCIES
1. Introducing Communication Systems	S 1.1	Participate in an organized personnel system to manage class and laboratory activities
	S 1.2	Define communication
	S 1.3	Identify, compare, and contrast the methods of people-to-people communications
	S 1.4	Explain methods of people-to-machine and machine-to-people communications
	S 1.5	Describe methods used for machine-to-machine communications
	S 1.6	Interview resource persons in communications to obtain career and technical information
2. Developing a Communication Model	2.1	List the major components of a communication system (model)
	2.2	Develop a communication model for the area of telecommunications, graphic arts, photography, or drafting
3. Using One-Way Telecommunication Systems	3.1	List examples of one-way communication systems
	3.2	Explain the basic principles of radio operation
	3.3	List the processes used for radio transmission
	3.4	Explain the basic principle of phonograph operation
	3.5	Identify and explain the function of a television receiver's subsystems
	3.6	Use the VTR or VCR to record a live program
	3.7	Use a cassette tape recorder to record voice over music
	3.8	Record a program for school or community group as a service activity
4. Using Two-Way Telecommunication Systems	S 4.1	Identify and list two-way telecommunication systems
	S 4.2	Explain the basic principles of telegraph operation
	S 4.3	List the components of a telephone system and explain their function
	S 4.4	List satellites by type and explain how they are used in communications
	S 4.5	Write and run a simple BASIC computer program
5. Using Drafting Equipment and	S 5.1	Use basic drafting equipment
	S 5.2	Differentiate among orthographic, schematic, and pictorial Techniquesdrawings
	S 5.3	Develop a line drawing
	S 5.4	Develop a freehand drawing
	S 5.5	Describe procedures used in tracing, blueprint, or diazo copy reproduction methods
6. Generating Images for Graphic Communications	S 6.1	List the major categories of image generation
	S 6.2	Identify image generation processes
	S 6.3	Develop a mechanical layout
	6.4	Produce a line negative from a mechanical layout
	S 6.5	Describe the relationship between ASA ratings and F-stop and shutter speed settings
	S 6.6	Produce properly exposed and developed negatives
	S 6.7	Produce properly exposed, enlarged, and processed black and white prints
7. Transferring Images for Graphic Communications	7.1	Compare and contrast the transfer process
	7.2	Use the offset press to make printed copies
	7.3	Produce a multicolor screen print
8. Participating in a Communications Enterprise	8.1	Develop a product package design and copy
	8.2	Participate in group enterprise project
	8.3	Plan and participate in competitions

NOTE: S designates competencies to be included in 18-week courses.



GRAPHIC COMMUNICATIONS

Graphic Communications deals with printed images in such as newspapers, books, printed T-shirts, signs, photographs, wallpaper, or stationery. Students use a variety of graphic arts equipment and processes to make visual projects with different materials. Students design, plan, and reproduce products similar to the graphic arts industry. Cameras, printing presses, and copy machines are among the many equipment items used.

PURPOSE	CODE	GRADE LEVEL	UNIT OF CREDIT	PREREQUISITES
Application and Adaptation	8458 (36 weeks)	10, 11, or 12	1	None

SELECTED COURSE GOALS

Experiences and activities of this course will enable the student:

1. To define the major elements of production and consumption of goods and services, including design of the product and composition, purchase, processing, and delivery of materials
2. To analyze and explain the roles of management and labor as they relate to graphic communications technology
3. To evaluate the elements of good design and interpret printing needs through problem-solving techniques
4. To demonstrate the safe use of equipment, supplies, materials, and processes related to the graphic communications technology
5. To increase proficiency through the use of the materials, equipment, and techniques related to the graphic communications industry
6. To analyze processes and techniques by combining, contrasting, and evaluating printing problems as they relate to graphic communications technology
7. To exhibit a willingness to discuss technical aspects of graphic communications technology with other students
8. To generate a positive attitude toward equipment operation and safe operating procedures
9. To describe the positive and negative aspects of various graphic communications positions as they relate to career outlooks.

GRAPHIC COMMUNICATIONS I

CONTENT/CONCEPT		TASK/COMPETENCIES
1. Introducing Graphic Communications Technology	S 1.1	Report on the history, purposes, and influences of graphic communications technology
	1.2	Identify principles of message analysis and development
	1.3	Describe the principles of message analysis and development
	S 1.4	Describe the methods of image generation
	1.5	Classify typefaces
	S 1.6	Define layout and paste-up terms, tools, and techniques
	S 1.7	Use metric, standard, and printer's measurements
	S 1.8	Define key terms and concepts related to photography
	1.9	Explain the types of printing and duplicating processes
	S 1.10	Follow shop safety rules
	1.11	Explain printing plant economics, job planning and cost estimating procedures, and legal considerations
	1.12	Compare types of paper and ink
	S 1.13	Identify binding and finishing processes
	S 1.14	Describe careers and occupations in graphic communications
2. Integrating the Student Organization Throughout the Course	S 2.1	Participate in AIASA classroom activities
	S 2.2	Identify community (industrial) and technical resources
	S 2.3	Participate in school or community improvement activities
	2.4	Participate in a group marketing enterprise project
	2.5	Participate in work competitions
3. Generating Images and Preparing Copy	S 3.1	Prepare thumbnail, rough, and comprehensive layouts
	S 3.2	Apply dry transfer lettering and border tape
	S 3.3	Select and paste up clip art
	S 3.4	Generate strike-on images, using a typewriter
	3.5	Generate images, using the strip printer
	3.6	Mark percentage of enlargement or reduction required on photographs
	3.7	Crop and size photographs
	3.8	Apply register marks and mark colors
	3.9	Cut outlines of artwork in masking film
	3.10	Proof camera-ready copy for photo-reproduction quality
4. Producing Reproduction Photographs	4.1	Describe the parts of a process camera
	4.2	Make exposure tests with process camera
	4.3	Produce a line negative
	4.4	Produce a halftone negative
	4.5	Produce line enlargements and reductions
	4.6	Mix film processing chemicals
	4.7	Develop film by gray scale method
	4.8	Develop film by time/temperature method
	4.9	Strip or mask negatives
	4.10	Strip halftones
	4.11	Opaque photostat imperfections
5. Producing Continuous Tone Photographs	S 5.1	Describe the types and parts of cameras
	S 5.2	Calculate exposure settings for various lighting situations
	S 5.3	Identify the types of continuous tone films and the characteristics of each
	S 5.4	Process a roll of black and white film
	S 5.5	Identify the types of photographic positive materials and use of each
	S 5.6	Produce black and white contact prints and enlargements

Graphic Communications I

	CONTENT/CONCEPT		TASK/COMPETENCIES
6.	Performing Screen Process Printing	S 6.1	Identify terms and concepts related to screen printing
		S 6.2	Stretch silk on frame
		S 6.3	Prepare paper stencils
		6.4	Prepare tusche stencils
		S 6.5	Prepare hand-cut film stencils
		6.6	Prepare photographic indirect stencils
		6.7	Prepare photographic direct stencils
		S 6.8	Produce screen process prints
		6.9	Produce multicolor screen process prints
7.	Producing and Using Offset Lithographic Plates	S 7.1	Describe the characteristics of metal, plastic, paper, and electrostatic plates
		S 7.2	Check flats for imperfections, blocked images, and im-Spositions
		S 7.3	Expose plates
		S 7.4	Prepare plate surface for press
		S 7.5	Analyze plates for press readiness
		S 7.6	Mount plate on press
		7.7	Clean and file plates
8.	Printing Materials, Using Various Methods	S 8.1	Identify the main parts and controls of an offset printing Spress
		S 8.2	Select paper stock
		S 8.3	Ink press
		S 8.4	Measure, mix, and add fountain solution
		S 8.5	Clean blanket
		S 8.6	Adjust feed table and feed controls
		8.7	Maintain paper register
		8.8	Adjust delivery unit on offset press
		S 8.9	Run solid color job
		8.10	Run two-color ink job in register
		8.11	Run screen tint copy job to specifications
		S 8.12	Clean plate
		8.13	Identify press problems
		8.14	Make a rubber stamp or carved linoleum block for hand relief printing
		8.15	Prepare a drypoint engraving for gravure printing
9.	Binding, Finishing, and Packing Materials	S 9.1	Operate padding press to make pads
		S 9.2	Operate paper cutter
		S 9.3	Operate folding machine
10.	Cleaning and Maintaining Equipment	S 10.1	Clean and maintain layout and paste-up equipment
		10.2	Clean and maintain process camera and darkroom equipment
		S 10.3	Clean and maintain press equipment
		S 10.4	Clean and maintain binding equipment

NOTE: S designates competencies to be included in 18-week courses.

DRAWING AND DESIGN TECHNOLOGY PROGRAM

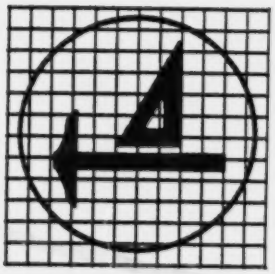
Program Overview

Drawing and Design Technology is a high school program consisting of at least 2 classroom/laboratory courses (300 hours of instruction). The program offers the following courses or options:

Basic Technical Drawing	8435
Engineering Drawing	8436
Architectural Drawing	8437

To complete the program, students must take Basic Technical Drawing and one of the other two courses listed. The instruction enables students to develop competencies in the areas of drafting and design, resulting in occupational readiness useful to the future craftsperson, technician, technologist, engineer, or consumer.

Program completers are prepared with competencies that will build a long-range foundation of technical application and adaptation useful for immediate employment or university programs.



BASIC TECHNICAL DRAWING

This basic mechanical drawing course provides for students the opportunity to experience the basic language of industry and technology. Students gain a background of skills and an understanding of the broad scope of mechanical drawing or drafting. The course is especially recommended for future engineering, architecture, or technology students.

PURPOSE	CODE	GRADE LEVEL	UNIT OF CREDIT	PREREQUISITES
Application and Adaptation	8434 (18 weeks) 8435 (36 weeks)	9, 10, or 11	1 maximum ½ minimum	None

SELECTED COURSE GOALS

Experiences and activities of this course will enable the student:

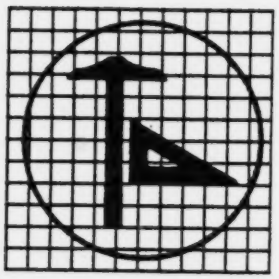
1. To narrate the contributions of drafting and design in the development, manufacture, or construction of commercial products
2. To read and interpret multiview, pictorial, and schematic drawings
3. To assess individual abilities and interests as they relate to current opportunities in drafting and design fields
4. To prepare multiview, pictorial, and schematic drawings through the use of instruments, using the proper drawing methods and conventions
5. To evaluate the quality of current drafting room products from tracing to final presentation drawings
6. To use resource and reference materials essential to major drafting/design areas
7. To evaluate positive and negative aspects of various drafting/design-related positions in terms of individual interest and aptitudes.

BASIC TECHNICAL DRAWING

	CONTENT/CONCEPT		TASK/COMPETENCIES
1.	Applying General Competencies	S 1.1	Trace drawings
		1.2	Correct and revise drawings
		1.3	Apply general shop processes to detail drawings
		1.4	Apply descriptive geometric principles
		S 1.6	Apply basic geometric construction principles
		S 1.7	Apply principles of dimensioning
		1.9	Use technical literature
		1.10	Apply and use a drafting standard manual
		1.11	Use and maintain a reference library
2.	Reproducing Drawings	S 2.1	Prepare prints of original drawings
3.	Maintaining and Using Tools and Equipment	S 3.2	Clean the drafting station
		S 3.3	Maintain drafting instruments and tools
		S 3.4	Use basic drafting tools and instruments
		S 3.5	Select appropriate drawing mediums and materials
5.	Lettering	S 5.1	Letter freehand
7.	Preparing Technical Freehand Drawings and Sketches	S 7.1	Prepare technical sketches, using orthographic projections
		S 7.2	Prepare pictorial technical sketches
		S 7.3	Prepare layout sketches
8.	Drawing Pictorials	8.1	Prepare isometric drawings of single parts and assembles
9.	Preparing Working Drawings	S 9.1	Prepare multiview drawings
		9.2	Prepare section and convention views
		9.3	Prepare auxiliary views
10.	Performing Mathematical Calculations	S 11.4	Use measuring devices
		S 11.5	Apply mathematical calculations involving practical geometry
12.	Using Related Information	S 12.1	Define technical drawing
		S 12.2	Describe the history of drafting
		12.4	Participate in the American Industrial Arts Student Association

NOTE 1: S designates competencies to be included in 18-week courses.

NOTE 2: These task/competencies are not listed in teaching sequence. Refer to Basic Technical and Engineering Drawing Instructional Resource Guide for course outline and sequence.



This course provides for students the opportunity to experience the graphic language of industry for engineers, manufacturers, and technicians. It continues in greater depth the drawing problems, skills, and techniques presented in Basic Technical Drawing. Emphasis is placed upon interpretation of industrial prints, ability to use handbooks with other resource materials, and adherence to established standards for drafting. This course covers important aspects of the application of drafting principles to typical engineering drawing and design problems.

PURPOSE	CODE	GRADE LEVEL	UNIT OF CREDIT	PREREQUISITES
Application and Adaptation	8436 (36 weeks)	10, 11, or 12	1	Basic Technical Drawing (Mechanical Drawing I)

SELECTED COURSE GOALS

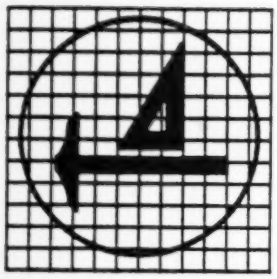
Experiences and activities of this course will enable the student:

1. To narrate and apply the processes of design
2. To recognize the principles of good design in commercial and student-designed products
3. To conceive realistically a specific occupational opportunity and remuneration relative to career goals
4. To determine the value and advantages of various types of drawing equipment pertinent to engineering drawing
5. To practice efficient and safe use of equipment and materials commonly used in design/drafting-related occupations
6. To prepare sets of working drawings that include detail drawings, assembly drawings, and working drawings
7. To develop accurate value judgments of the types and amounts of training required for various job entry levels
8. To use resource and reference materials essential to major engineering drawing areas.

ENGINEERING DRAWING

	CONTENT/CONCEPT		TASK/COMPETENCIES
1.	Applying General Competencies	1.5	Select the appropriate type of projection to represent an object
		1.7	Apply principles of dimensioning
3.	Maintaining and Using Tools and Equipment	3.6	Prepare ink drawings
7.	Preparing Technical Freehand Drawings and Sketches	7.2	Prepare pictorial technical sketches
8.	Drawing Pictorials	8.1	Prepare isometric drawings of single parts and assemblies
		8.2	Prepare oblique drawings of single parts and assemblies
9.	Preparing Working Drawings	9.4	Prepare revolution views
		9.5	Prepare intersection views of geometric solids
		9.6	Prepare development drawings
		9.7	Prepare drawings of cams
		9.8	Prepare drawings of gears and splines
		9.9	Prepare assembly drawings
		9.10	Prepare a set of working drawings
10.	Drawing Screws, Threads, Fasteners, and Springs	10.1	Draw a detail thread representation
		10.2	Draw a schematic thread representation
		10.3	Draw a simplified thread representation
11.	Performing Mathematical Calculations	11.4	Use measuring devices
12.	Using Related Information	12.1	Participate in an organized personnel system to manage class and laboratory activities
		12.3	Define engineering drawing
		12.4	Participate in the American Industrial Arts Student Association

NOTE: These task/competencies are not listed in teaching sequence. Refer to Basic Technical and Engineering Instructional Resource Guide for course outline and sequence.



ARCHITECTURAL DRAWING

This course provides for students the opportunity to learn more about the principles of architecture and related drafting practices and techniques, building on the knowledge and skills mastered in Basic Technical Drawing. It provides information helpful for the homeowner and is especially beneficial to the future architect, interior designer, or homebuilder.

PURPOSE	CODE	GRADE LEVEL	UNIT OF CREDIT	PREREQUISITES
Application and Adaptation	8437 (36 weeks)	10, 11, or 12	1	Basic Technical Drawing

SELECTED COURSE GOALS

Experiences and activities of this course will enable the student:

1. To narrate and apply the processes of architectural design
2. To recognize the principles of good design in commercial and student-designed buildings
3. To conceive realistically a specific occupational opportunity and remuneration relative to career goals
4. To determine the value and advantages of various types of drawing equipment pertinent to architectural drawing
5. To use resources and reference materials essential to major architectural drawing areas
6. To practice efficient and safe use of equipment and materials commonly used in design-related occupations
7. To prepare sets of architectural drawings that include floor plans, cross detail sections, elevations, perspectives, electrical plans, plumbing plans, schedules, and specifications
8. To develop accurate value judgments of the types and amounts of training required for various job entry levels.

ARCHITECTURAL DRAWING

	CONTENT/CONCEPT		TASK/COMPETENCIES
1.	Preparing Presentation Drawings and Materials	1.1	Prepare design sketches
		1.2	Draw interior perspective views
		1.3	Draw exterior perspective views
		1.4	Draw presentation floor plans
		1.6	Render presentation designs, using ink
		1.8	Build presentation models
		1.9	Letter presentation drawings, using mechanical lettering sets
		1.10	Letter presentation drawings, using transfer and pressure-sensitive letters
2.	Performing Site and Plot Plan Drafting Activities	2.1	Draw a plot plan
3.	Drawing Architectural Plans	3.1	Sketch a preliminary plan layout
		3.2	Draw a floor plan
		3.3	Draw a basement plan
		3.4	Draw a foundation plan
		3.5	Draw a concrete slab plan
		3.6	Draw a joist framing plan
4.	Drawing Architectural Elevations	4.1	Sketch preliminary elevations
		4.2	Draw exterior elevations
		4.3	Draw interior elevations
5.	Drawing Architectural Sections/Details	5.2	Draw foundation sections
		5.3	Draw floor sections
		5.4	Draw wall sections
		5.8	Draw stair sections/details
		5.9	Draw fireplace/chimney sections/details
		5.11	Draw door and window sections
6.	Performing Supplemental Drafting Activities	6.2	Prepare a plan abbreviations list
		6.3	Add drawing identification/location information
		6.4	Draw door and window schedules
7.	Introducing Architectural Drawing	7.1	Define architectural drawing
		7.2	Describe job opportunities and qualifications
		7.3	Participate in student association activities
		7.4	Explain basic types of houses
8.	Preparing Specialized Drawings and Plans	8.1	Write specifications
		8.2	Prepare electrical plans
		8.3	Prepare heating and air conditioning plans
		8.4	Prepare plumbing plans
		8.5	Describe factors and methods of financing
9.	Integrating the Student Organization throughout the Course	9.1	Participate in an organized personnel system to manage class and laboratory activities

NOTE: These task/competencies are not listed in teaching sequence. Refer to Architectural Drawing Instructional Resource Guide for course outline and sequence.

ELECTRONICS TECHNOLOGY PROGRAM

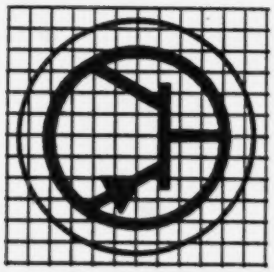
Program Overview

Electronics Technology is a high school program consisting of at least 2 classroom/laboratory courses (300 hours of instruction). The program offers the following courses or options:

Electricity/Electronics I	8417/8416
Electricity/Electronics II	8412

The instruction enables students to develop competencies in the high-tech area of electronics, resulting in occupational readiness useful to the future craftsperson, technician, technologist, engineer, or consumer.

Program completers are prepared with competencies that build a long-range foundation of technical application and adaptation useful for immediate employment or articulation with advanced occupational preparation in trade and industrial, community college, or university programs.



ELECTRICITY/ELECTRONICS I

Students experiment with simple electrical devices and circuits and build projects, using DC and AC devices and circuits.

PURPOSE	CODE	GRADE LEVEL	UNIT OF CREDIT	PREREQUISITES
Application and Adaptation	8416 (36 weeks) 8417 (18 weeks)	9, 10, or 11	1 maximum ½ minimum	None

SELECTED COURSE GOALS

Experiences and activities of this course will enable the student:

1. To recall and use electricity/electronics terms in conversation and writing
2. To demonstrate in class the skills and techniques useful for general maintenance of electrical devices
3. To become familiar with the use of basic components in DC and AC circuits
4. To operate basic test and measuring devices used in electrical circuits
5. To exhibit safe practices in working with electrical circuits and devices
6. To construct an electrical project, using DC and AC devices and circuits
7. To organize and list in order the criteria for choosing and buying electrical devices
8. To display an appreciation for electrical devices.

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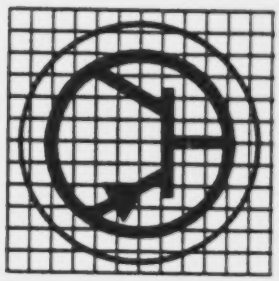
ELECTRICITY/ELECTRONICS TECHNOLOGY I

CONTENT/CONCEPT		TASK/COMPETENCIES
1. Exploring Electricity and Electronics Technology and Industries	S 1.1	Explore occupations related to electricity and electronics technology
	S 1.2	Identify (establish) management systems
2. Organizing Safety and Laboratory Management Systems	S 2.1	Identify safety rules and use lab machines and equipment safely
	S 2.2	Participate in organized personnel system to manage class and laboratory activities
3. Applying Electrical Concepts	S 3.1	Identify electricity/electronics applications
	S 3.2	Identify and describe atomic structure
	S 3.3	Define a molecule
	S 3.4	Illustrate and describe the law of charges
	S 3.5	Define and describe static electricity
	S 3.6	Define and describe electromotive force (voltage)
	S 3.7	Define and describe current electricity
	S 3.8	Determine the direction of current flow in DC circuits
	S 3.9	Determine the direction of current flow in AC circuits
	S 3.10	Explain the difference between electrical conductors and Sinsulators
	S 3.11	Define and describe semiconductors
4. Generating Electricity	S 4.1.	Explain the use of friction to generate electricity
	S 4.2	Explain the use of light to generate electricity
	S 4.3	Explain the use of heat to generate electricity
	S 4.4	Explain the use of pressure to generate electricity
	S 4.5	Explain the use of chemicals to generate electricity
	4.6	List the types of primary cells and their applications
	4.7	Explain the operation of a lead-acid secondary cell
	4.8	Explain how a fuel cell is used to produce electricity
	S 4.9	Explain how magnetism is used to produce electricity
5. Drawing Circuits and Power Supplies	S 5.1	Identify and draw electronic components and symbols
	S 5.2	Describe the parts of a simple circuit
	5.3	Determine wire sizes with an American wire gauge
	S 5.4	Analyze the factors affecting resistance of wires
	S 5.5	Describe types of resistors and their functions
	S 5.6	Read color-coded resistors
	S 5.7	Explain how circuits are protected
	S 5.8	Describe types of control devices
	S 5.9	Draw schematic diagrams
	S 5.10	Measure voltage
	S 5.11	Measure current
	S 5.12	Verify Ohm's Law
	S 5.13	Compute electrical power
	S 5.14	Determine current, voltage, and resistance in series circuits
	S 5.15	Determine current, voltage, and resistance in parallel circuits
	S 5.16	Determine current, voltage, and resistance in series-parallel circuits (combination)
	5.17	Prepare printed circuits

	CONTENT/CONCEPT		TASK/COMPETENCIES
6.	Measuring Components With Test Equipment	6.1	Identify components and functions of multimeter circuits
		S 6.2	Measure resistance in ohms with multimeter
		S 6.3	Measure DC current with multimeter
		S 6.4	Measure DC amps with multimeter
		S 6.5	Measure AC volts with multimeter
		S 6.6	Use laboratory power supplies
		S 6.7	Operate oscilloscope
		S 6.8	Compare DC and AC waveforms, using the oscilloscope
		6.9	Measure AC voltage with the oscilloscope
		6.10	Measure frequency and phase angles with oscilloscope
		6.11	Operate capacitor tester
		S 6.12	Identify operating controls, leads, functions, and ranges of a digital multimeter
		6.13	Operate audio-frequency generator
		6.14	Operate radio-frequency generator
7.	Magnetizing Materials and Relays	S 7.1	Demonstrate the laws of magnetism
		S 7.2	Explain the electron theory of magnetism
		S 7.3	Demonstrate how an electromagnet operates
		S 7.4	Map magnetic fields and show their interactions
		S 7.5	Magnetize iron bars and determine the polarity of the magnets formed
		7.6	Construct a magnetic relay
8.	Using AC or DC Generators and Motors	S 8.1	Explain how electricity is generated by magnetism
		S 8.2	Explain how AC current is generated
		S 8.3	Explain how DC current is generated
		8.4	Explain the operation of a car alternator
		8.5	Describe types and characteristics of AC generators
		8.6	Describe types and characteristics of DC generators
		8.7	Explain how generator voltages are regulated
		8.8	Describe types of DC motors
		8.9	Describe types of AC motors
9.	Explaining Inductance and RL Circuits	S 9.1	Explain inductance
		9.2	Determine inductive reactance (theory)
		9.3	Determine inductive reactance (experiment)
		9.4	Explain how an RL circuit operates
		S 9.5	Explain transformer operation
10.	Describing Capacitance in RC Circuits	S 10.1	Define capacitance
		S 10.2	Demonstrate capacitance reactance
		S 10.3	Describe the physical properties of capacitors and their ratings
		10.4	Explain the operation of RC circuits
11.	Using Tuned Circuits and RLC Networks	S 11.1	Identify current, voltage, and impedance in an RLC circuit circuit
		11.2	Determine resonance in RLC circuits
20.	Integrating the Student Organization Throughout the Course	S 20.1	Participate in AIASA classroom activities
		S 20.2	Investigate community industrial and technical resources
		20.3	Participate in school (or community) improvement activities
		S 20.4	Participate in group marketing enterprise project
		S 20.5	Plan and participate in competitions
		S 20.6	Participate in an organized personnel system to manage class and laboratory activities

NOTE 1: S designates competencies to be included in 18-week courses.

NOTE 2: These task/competencies are not listed in teaching sequence. Refer to Electricity/Electronics Technology Instructional Resource Guide for course outline and sequence.



Students work with electronic devices, instruments, and circuits, building projects to apply theories and laws with electronic components such as resistors, capacitors, and transistors. They also study integrated circuits used in computers, amplifiers, television, and other equipment.

PURPOSE	CODE	GRADE LEVEL	UNIT OF CREDIT	PREREQUISITES
Application and Adaptation	8412 (36 weeks)	10, 11, or 12	1	Electricity/ Electronics Technology I

SELECTED COURSE GOALS

Experiences and activities of this course will enable the student:

1. To narrate basic concepts of the electron theory
2. To interpret general schematic diagrams
3. To explain the needs for a systematic and safe procedure in setting up experimental circuits and servicing equipment
4. To explain the theory of operation in AC and DC circuits of Ohm's Law, Kirchoff's Law, and Watt's Law involving resistors, coils, capacitors, and transistors
5. To develop proficiency in the safe use of electrical test equipment and methods of solving circuit problems
6. To exhibit insight into the application of technology to problems of electrical design and servicing
7. To evaluate the significance of manufactured products produced by the electricity/electronics industry to the future needs of industry and society
8. To describe the importance of following regulations in the installation of electrical components.

ELECTRICITY AND ELECTRONICS TECHNOLOGY II

CONTENT/CONCEPT	TASK/COMPETENCIES
1. Exploring Electricity and Electronics Technology and Industries	1.2 Identify (establish) management systems
2. Organizing Safety and Laboratory Management Systems	2.1 Identify safety rules and use lab machines and equipment safely 2.2 Participate in organized personnel system to manage class and laboratory activities
3. Applying Electrical Concepts	3.1 Identify electricity/electronics applications
12. Understanding Vacuum Tubes and Semiconductors	12.1 Describe thermionic emission of electrons 12.2 Explain the major characteristics of vacuum tubes 12.3 Demonstrate the use of tube testers 12.4 Explain the operation of P-N junctions 12.5 Describe the physical characteristics of diodes and transistors 12.6 Test transistors
13. Using and Regulating Power Supplies	13.1 Differentiate among types of power supplies 13.2 Explain the difference between half-wave and full-wave rectification 13.3 Demonstrate the actions of filter circuits 13.4 Explain power supply voltage regulation
14. Amplifying Signals and Testing Output	14.1 Explain electron signal amplification 14.2 Compare various types of amplifier couplings 14.3 Test amplifiers 14.4 Use technical data associated with amplifiers
15. Oscillating Circuits	15.1 Explain the principles of oscillation 15.2 Differentiate among types of oscillators 15.3 Describe applications of oscillators
16. Transmitting Radio Signals	16.1 Identify and describe basic communication models 16.2 Explain general transmitter operation 16.3 Explain the operation of AM transmitters 16.4 Explain the operation of FM transmitters
17. Receiving Radio Signals	17.1 Compare the operation of AM and FM receivers 17.2 Explain the basic operation of RF tuning circuits 17.3 Explain the superheterodyne principle 17.4 Describe IF amplifiers 17.5 Explain detection systems
18. Understanding Monochrome Television Receiver Controls	18.1 Identify operator- and technician-adjusted controls of a monochrome television receiver and explain their functions 18.2 Operate television receiver controls
19. Using Integrated Circuits	19.1 Compare the operation of linear and digital integrated circuits 19.2 Describe applications of linear integrated circuits 19.3 Describe the characteristics of digital integrated circuits 19.4 Demonstrate the operation of basic logic gates 19.5 Test digital integrated circuits
20. Integrating the Student Organization Throughout the Course	20.1 Participate in AIASA classroom activities 20.2 Investigate community industrial and technical resources 20.3 Participate in school (or community) improvement activities 20.4 Participate in group marketing enterprise project 20.5 Plan and participate in competitions

NOTE: These task/competencies are not listed in teaching sequence. Refer to Electricity/Electronics Technology Instructional Resource Guide for course outline and sequence.

POWER AND TRANSPORTATION TECHNOLOGY PROGRAM

Program Overview

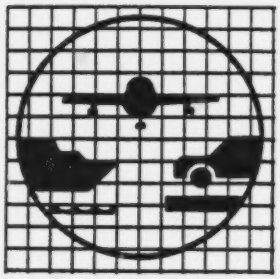
Power and Transportation Technology is a high school program consisting of at least 2 classroom/laboratory courses (300 hours of instruction). The program offers the following courses or options:

Power and Transportation Technology	8445/8444
Energy and Power	8448

The instruction enables students to develop competencies in the areas of power, energy, and transportation, which will result in occupational readiness useful to the future technician, technologist, or consumer.

Program completers are prepared with competencies that build a long-range foundation of technical application and adaptation useful for immediate employment or articulation with advanced occupational preparation in trade and industrial, community college, or university programs.

POWER AND TRANSPORTATION



Students survey the many broad sources of energy and power used in power and transportation systems. Instruction includes: (1) how energy is converted to power; (2) how power is transmitted and controlled; and (3) how power is used through mechanical, fluid, and electrical devices. Students explore career opportunities in power and transportation fields and build projects, conduct experiments, and repair mechanical devices such as small engines, electric motors, and outboard motors.

PURPOSE	CODE	GRADE LEVEL	UNIT OF CREDIT	PREREQUISITES
Application and Adaptation	8445 (36 weeks) 8444 (18 weeks)	9, 10, or 11	1 maximum ½ minimum	None

SELECTED COURSE GOALS

Experiences and activities of this course will enable the student:

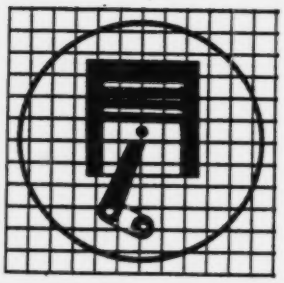
1. To recall how energy is converted, transmitted, controlled, and applied to transportation systems
2. To describe the basic operating principles of heat engines and how they can be applied to transportation systems
3. To identify occupational preparation programs available in the high school and community college related to power and transportation technology
4. To use properly the nomenclature associated with mechanical, fluid, and electrical devices
5. To explain critically how power is used through mechanical, fluid, and electrical devices
6. To demonstrate safe practices in working with power systems, tools, and equipment
7. To tune up a one-cylinder, four-cycle engine
8. To construct basic fluid power circuits
9. To exhibit efficient use of time
10. To use good work habits of orderliness, cleanliness, and care of property.

POWER AND TRANSPORTATION TECHNOLOGY

CONTENT/CONCEPT	TASK/COMPETENCIES	
1. Introducing Power Technology	S 1.1	Explain terms used in power and transportation technology
	1.2	Make measurements in power technology
	S*1.3	Identify safety rules and employ safe procedures in use of tools and machines
	S 1.4	Match careers and occupations in the fields of power and transportation with their educational requirements
	S*1.5	Establish an AIASA personnel management system
2. Identifying Sources of Energy	2.1	Explain advantages, disadvantages, and uses of major fossil fuels
	2.2	Explain nuclear fuel as an energy source
	S 2.3	Explain how natural energy sources are used to produce electricity
3. Exploring Mechanical Power	S 3.1	Construct simple machines and calculate their mechanical advantage
	S 3.4	Explain function and use of clutches
4. Exploring Electrical Power	4.1	Explain composition of matter
	S 4.2	Explain electron energy
	S 4.3	Perform electrical measurements
	4.4	Explain electrical sources
	4.5	Construct and analyze electrical circuitry
	4.6	Demonstrate the use of relays and switches in electrical circuits
5. Exploring Electrical Motors	S 5.1	Explain the law of magnetism
	5.2	Explain the differences among motors and how they start
6. Using Fluid Power	S 6.1	Demonstrate the use and operation of fluid power systems
	S 6.2	Describe components used in a fluid power system (hydraulic)
	6.3	Construct an operational fluid system (pneumatic)
	S 6.4	Use fluid power gauges for measurement
7. Exploring Small Thermal Engines	S 7.1	Explain the theory of thermal engine operation
	S 7.2	Classify types of thermal engines
	S 7.3	Measure major components of thermal engines
	7.4	Identify, handle, and mix fuels and lubricants
	7.5	Explain and differentiate between the 2-stroke cycle and the 4-stroke cycle engines
	7.6	Repair and adjust fuel systems of the 2-stroke cycle and the 4-stroke cycle engines
	7.7	Repair and adjust ignition systems of 2-stroke cycle and 4-stroke cycle engines
	7.8	Inspect and repair powertrain components of 2- and 4-stroke cycle engines
	7.9	Inspect and repair the cooling system of 2-and 4-stroke cycle engines
	7.10	Inspect and repair the lubricating system of 2- and 4-stroke cycle engines
	S 7.11	Disassemble, inspect, and assemble 4-stroke cycle engine
	7.12	Tune and service 2- and 4-stroke cycle engines
	7.13	Service, inspect, and repair a lawnmower
	7.14	Cross-reference and price repair parts
8. Exploring Automotive Engines	8.1	Identify multicylinder engines by valve and cylinder arrangement
	8.2	Explain the functions of major systems of automotive engines
	8.3	Tune and service multicylinder automotive engines
9. Repairing and Servicing Special Thermal Engines	9.1	Service and repair marine engines
	9.2	Explain service and repair of rotary engines
	9.3	Service and repair diesel engines
10. Investigating Transportation Systems	10.1	Plan a mass transportation system
	10.2	Construct a working model of a land, sea, or air vehicle
11. Integrating the Student Organization Throughout the Course	S*11.1	Investigate community (industrial) and technical resources
	S*11.2	Participate in school (or community) improvement activities
	S*11.3	Participate in group marketing project
	S*11.4	Plan and participate in competitions

*On-Going Activities

NOTE: S designates competencies to be included in 18-week courses.



ENERGY AND POWER

Students learn about the application of power and energy systems to common power devices and transportation vehicles and apply theory to the practical servicing of common machines such as small gasoline engines, outboard motors, motorcycles, and lawnmowers.

PURPOSE	CODE	GRADE LEVEL	UNIT OF CREDIT	PREREQUISITES
Application and Adaptation	8448 (36 weeks)	10, 11, or 12	1	None

SELECTED COURSE GOALS

Experiences and activities of this course will enable the student:

1. To determine some of the economic and social effects of thermal, mechanical, and fluid power on society
2. To determine the working conditions in a service enterprise
3. To describe the automotive electrical and fuel systems
4. To demonstrate the principles of internal and external combustion engines
5. To exhibit safe practices in working with power systems, tools, and equipment
6. To prepare a service order
7. To perform a tune-up
8. To exhibit efficiency in use of time
9. To show a willingness to use good work habits, such as orderliness, cleanliness, and care of property.

ENERGY AND POWER

CONTENT/CONCEPT	TASK/COMPETENCIES
1. Introducing Power	1.1 Define terms used in power systems
	1.2 Construct a mechanical power system
	1.3 Troubleshoot and repair a malfunctioning electrical system
	1.4 Identify fluidal system components
	1.5 Explain how thermal energy is used in engines
	1.6 Participate in an organized personnel system to manage class and laboratory activities
2. Exploring Thermal Power (Internal Combustion Engines)	2.1 Identify the major subsystems of the automobile engine
	2.2 Compare diesel and gasoline engine operating principles
	2.3 Explain the function of fuel system components
	2.4 Adjust and set ignition timing
	2.5 Maintain and service a cooling system
	2.6 Identify the major components of a transmission
	2.7 Trace the transfer of energy through a powertrain
	2.8 Select oil by grade, weight, and additive
	2.9 Remove, inspect, reinstall or replace, and adjust ignition system components
	2.10 Troubleshoot and isolate engine malfunction
	2.11 Explain the functions of the major subsections of a gas turbine engine
	2.12 Identify major subsystem components of a diesel engine
	2.13 Identify the major operational systems of an outboard engine
	2.14 Identify community and technical resources
3. Exploring Pneumatics	3.1 Construct a simple pneumatic circuit
	3.2 Construct a complex pneumatic circuit
	3.3 Construct a multifunction pneumatic circuit
4. Exploring Hydraulics	4.1 Construct a controlled hydraulic delay circuit
	4.2 Construct a hydraulic delay circuit
	4.3 Construct a multifunction hydraulic circuit
5. Exploring Electric Motors	5.1 Identify sizes and types of electric motors
	5.2 Determine the working characteristics of a motor
	5.3 Explain how a split-phase motor operates
	5.4 Identify characteristics of the permanent split-capacitor motor
	5.5 Construct a circuit containing a shaded pole motor
	5.6 Identify the capacitor start/run motor by its physical characteristics
	5.7 Explain the principles of operation of a series motor
	5.8 Construct a circuit, using a three-phase motor
	5.9 Explain electrical energy transfer through mutual induction in transformers
	5.10 Participate in school or community improvement activities
6. Exploring Motor Controls	6.1 Identify the controls used to start, stop, and reverse an electrical motor
	6.2 Construct a motor speed control circuit
	6.3 List the methods to control a motor by time or temperature
	6.4 Construct a motor control, using a step-down transformer
	6.5 Inspect, repair, and test an electrical motor
	6.6 Participate in a group enterprise project
	6.7 Participate in competitive events

PRINCIPLES OF TECHNOLOGY PROGRAM

Program Overview

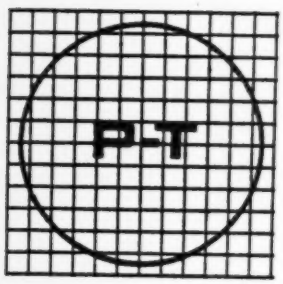
Principles of Technology is a high school program consisting of 2 classroom/laboratory courses (300 hours of instruction). The program offers the following course sequence:

Principles of Technology I	(Units 1-7)	9811
Principles of Technology II	(Units 8-14)	9812

The instruction enables students to develop competencies in the area of applied physics that enhances occupational readiness useful to the future technician, technologist, engineer, or consumer.

Program completers are prepared with competencies that build a long-range foundation of technical application and adaptation useful in immediate employment or complementary to advanced study in the applied sciences.

PRINCIPLES OF TECHNOLOGY I



Students apply physics and math principles through a unified systems approach for a broad knowledge base of the principles underlying modern technical systems. As a foundation for more education and training in advanced technology career paths, the "principles and systems" approach ensures career flexibility as machines and technology advance. The course covers seven technical principles: force, work, rate, resistance, energy, power, and force transformers, emphasizing how each principle plays a unifying role in the operation of mechanical, fluid, electrical, and thermal systems in high-tech equipment.

PURPOSE	CODE	GRADE LEVEL	UNIT OF CREDIT	PREREQUISITES
Application and Adaptation	9811 (36 weeks)	10 or 11	1	None

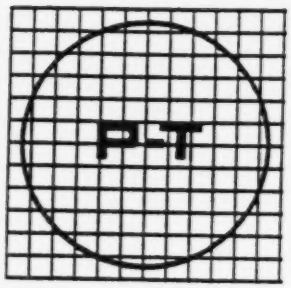
SELECTED COURSE GOALS

Experiences and activities of this course will enable the student:

1. To increase employability in technical careers
2. To use the principles rather than specifics of technology
3. To understand mathematics associated with principles
4. To meet some of the increased requirements for high school graduation.

PRINCIPLES OF TECHNOLOGY I

The task list for this course is currently being developed and will be distributed at a later date.



PRINCIPLES OF TECHNOLOGY II

Students apply physics and math principles through a unified systems approach for a broad knowledge base of the principles underlying modern technical systems. As a foundation for more education and training in advanced technology career paths, the "principles and systems" approach ensures career flexibility as machines and technology advance. The course covers seven technical principles: momentum, waves, energy converters, transducers, radiation, optical systems, and time constants, emphasizing how each principle plays a unifying role in the operation of mechanics, fluid, electrical, and thermal systems in high-tech equipment.

PURPOSE	CODE	GRADE LEVEL	UNIT OF CREDIT	PREREQUISITES
Application and Adaptation	9812 (36 weeks)	11 or 12	1	Principles of Technology I

SELECTED COURSE GOALS

Experiences and activities of this course will enable the student:

1. To increase employability in technical careers
2. To use the principles rather than specifics of technology
3. To understand mathematics associated with principles
4. To meet some of the increased requirements for high school graduation.

PRINCIPLES OF TECHNOLOGY II

The task list for this course is currently being developed and will be distributed at a later date.

PRODUCTION TECHNOLOGY PROGRAM

Program Overview

Production Technology is a high school program consisting of at least 2 classroom/laboratory courses (300 hours of instruction). The program offers the following courses or options:

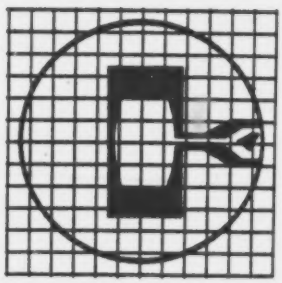
Materials and Processes Technology	8433/8478
Construction Technology	8431/8432
Manufacturing Technology	8425/8426
Metals Technology	8439/8430
Woods Technology	8449/8440

To complete the program, students may take two 36-week courses, four 18-week courses, or any combination thereof.

The instruction enables students to develop competencies in the areas of materials sciences, processes, and enterprise, resulting in occupational readiness useful to the future craftsperson, technician, technologist, or consumer.

Program completers are prepared with competencies that build a long-range foundation of technical application and adaptation useful for immediate employment or articulation with advanced occupational preparation in trade and industrial, community college, or university programs.

MATERIALS AND PROCESSES TECHNOLOGY



Students focus on industrial/technical materials and processes as they fabricate usable products and conduct experiments. Learning experiences include career analysis, as well as use of tools and equipment related to analysis, testing, and processing of metals, plastics, woods, ceramics, and composite materials. The course is recommended for students interested in technical careers and others wishing to improve their consumer knowledge and technological literacy.

PURPOSE	CODE	GRADE LEVEL	UNIT OF CREDIT	PREREQUISITES
Application and Adaptation	8433 (36 weeks) 8478 (18 weeks)	9, 10, or 11	1 maximum ½ minimum	None

SELECTED COURSE GOALS

Experiences and activities of this course will enable the student:

1. To recall the basic nature, classifications, and properties of woods, metals, plastics, ceramics, composites, and other materials
2. To explain the industrial processes employed to fabricate woods, metals, plastics, ceramics, and composites into functional items
3. To identify career paths for a selected career field in materials and processes technology
4. To investigate the effects of materials on ecological balance, the use and conservation of natural resources, and the potential for recycling
5. To demonstrate problem-solving techniques in selecting and fabricating products
6. To demonstrate proficiency in the safe operation of metalworking, woodworking, plastic, ceramic, measuring, and testing tools and machines
7. To select and compare the operations necessary for the production of a particular product made of plastics, metals, wood, ceramics, and composites
8. To recognize the need for knowledge of principles of math, science, and technology to participate fully in a rapidly developing technological society
9. To determine the potential career opportunities in materials and processes technology in the year 2000
10. To appreciate the knowledge, skills, and aptitudes necessary for different levels of employment in fields related to materials and processes technology
11. To exhibit good work habits and to respect and cooperate with associates.

MATERIALS AND PROCESSES TECHNOLOGY

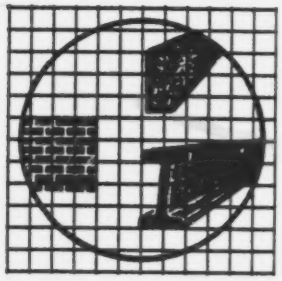
CONTENT/CONCEPT		TASK/COMPETENCIES
1. Evaluating the Benefits of Materials and Processes	S 1.1	List technological developments related to materials and processes technology
	S 1.2	Explain the personal value gained by a study of materials and processes technology
2. Following Safe Laboratory Procedures	S 2.1	Wear appropriate clothing or devices for safe laboratory activities
	S 2.2	Recall emergency procedures to follow in the event of an accident
3. Assessing Careers and Personnel	S 3.1	Evaluate careers related to industrial materials technology
	S 3.2	Describe the members of an engineering team and summarize how they interact
4. Analyzing the Nature and Properties of Materials	S 4.1	Explain the basic structure of atoms and ions
	4.2	Relate microstructure and macrostructure to the makeup of industrial materials
	S 4.3	Identify the sources of raw materials and recall methods of obtaining materials
	S 4.4	Recall the four main groups of the family of industrial materials
	S 4.5	Distinguish between metals and non-metals in terms of raw materials and structure
	S 4.6	Analyze the value of individual materials
	4.7	Recall the basic nature of corrosion/oxidation
	4.8	Determine how to increase corrosion/oxidation resistance
	S 4.9	Recall typical physical properties of materials
	4.10	Recognize conditions that cause stress in materials
	4.11	Measure common mechanical properties
	4.12	Differentiate between destructive and nondestructive testing
5. Exploring Processing and Manufacturing Systems	S 5.1	Outline the general procedures in which a product or system is engineered and manufactured
	5.2	Differentiate between custom and mass production in product and system design
	5.3	Recall basic elements in an automated design/manufacturing system
	S 5.4	Use basic measuring and layout tools
	S 5.5	Select and perform the most efficient and appropriate processes to produce a particular product
	S 5.6	Analyze industrial processes to relate them to processes used in the school laboratory
	5.7	Perform inspection and quality control tasks and relate them to similar procedures used in industry
6. Using Plastics and Other Other Synthetic Polymers	6.1	Describe the microstructure of synthetic polymers and basic methods to synthesize such polymers
	6.2	Select appropriate plastics, elastomers, adhesives, and protective coatings based on their properties
	6.3	Produce plastics and use adhesive and synthetic polymer coatings through combining techniques
	S 6.4	Use separating techniques on plastics
	S 6.5	Use forming techniques on plastics
	S 6.6	Produce finished surfaces on plastics
	S 6.7	Apply plastic/polymeric materials and processes to problems, product designs, or prototypes

Materials and Processes Technology

CONTENT/CONCEPT		TASK/COMPETENCIES
7. Selecting and Processing Metals	7.1	Recall the basic structure of metals
	7.2	Recall typical properties of metals and alloys
	S 7.3	Perform basic metal-forming techniques
	S 7.4	Exhibit skills in basic metals separation processes
	7.5	Exhibit skills in basic metal combining techniques
	7.6	Recall methods for conditioning metals
	S 7.7	Apply metal materials and processes to problems, product designs, or a prototype
8. Grading and Using Wood and Forest Products	S 8.1	Analyze the basic nature of wood and forest products
	S 8.2	Select woods for use based on their properties
	S 8.3	Use separating techniques on woods
	S 8.4	Select a method and combine wood
	8.5	Perform forming procedures on woods
	8.6	Determine appropriate conditioning technique and use it to ensure wood preservation
	S 8.7	Apply wood-materials and processes to problems, product designs, or a prototype
9. Selecting and using Ceramic Materials	9.1	Recall the basic structure of ceramics
	9.2	Select ceramics based on their properties
	9.3	Produce ceramic products and parts
10. Processing Composite Materials	10.1	Determine the value and applications of composite materials
	10.2	Produce composite parts and products
11. Integrating the Student Organization Throughout the Course	S 11.1	Establish an AIASA personnel management system
	S 11.2	Investigate community (industrial) and technical resources
	11.3	Participate in school or community improvement activities
	11.4	Participate in a group marketing project
	11.5	Plan and participate in competitions

NOTE 1: S designates competencies to be included in 18-week courses.

NOTE 2: Student organization activities should be integrated into the course where appropriate. Refer to Instructional Task/Competencies for Materials and Processes Technology for a suggested scheme of incorporation.



CONSTRUCTION TECHNOLOGY

Students design, build, and test scale model structures, working with projects that help them to understand the jobs of architects, carpenters, electricians, plumbers, surveyors, contractors, masons, design engineers, and a variety of other construction careers. (This course is a companion to Manufacturing Technology.)

PURPOSE	CODE	GRADE LEVEL	UNIT OF CREDIT	PREREQUISITES
Application and Adaptation	8431 (36 weeks) 8432 (18 weeks)	10, 11, or 12	1 maximum ½ minimum	None

SELECTED COURSE GOALS

Experiences and activities of this course will enable the student:

1. To identify and describe the functions of management technology related to the construction of a project on a site
2. To recognize and cite evidence of the effects of construction technology on society
3. To describe career opportunities and job requirements in the construction industry
4. To demonstrate a basic proficiency in the safe handling of tools and in the techniques used in the construction industry
5. To apply principles of planning and design of materials to the preparation of working drawings
6. To solve meaningful problems and relate the problem-solving processes to other in-school problematic situations
7. To exhibit a positive attitude toward safe working conditions and practices while using tools and materials
8. To express positive opinions concerning the influence of the construction industry on society
9. To demonstrate an understanding and appreciation of the value of work in one's life.

CONSTRUCTION TECHNOLOGY

CONTENT/CONCEPT		TASK/COMPETENCIES
QUAD I		
1. Organizing Personnel Study of Construction	S 1.1	Participate in student orientation activities
	S 1.2	Explain how people use technology tools and materials
	S 1.3	Participate in work groups for efficient classroom operation
2. Planning Model Construction Projects	S 2.1	Evaluate home design and construction details
	S 2.2	Plan ahead for needs in home construction
	S 2.3	Explain factors in selecting and purchasing a lot
	S 2.4	Plan living spaces, costs, and arrangements for home
	S 2.5	Identify basic and non-basic living spaces for floor plan
	S 2.6	Prepare final floor plan and calculate cost
	S 2.7	Draw door and window openings on floor plan
	S 2.8	Analyze beams, using test data
	S 2.9	Analyze roof frames, using test data
	S 2.10	Make foundation plan for floor plan
	S 2.11	Make foundation plan with electrical details
	S 2.12	Make elevation drawings of right side and front of home
	S 2.13	Make left side and rear elevation drawings
	S 2.14	Make plot plan for home
	S 2.15	Write specifications for exterior of home
	S 2.16	Write specifications for interior of home
3. Making Models of Construction Projects	S 3.1	Build the substructure of model, using safe practices
	S 3.2	Lay out and build walls
	S 3.3	Cut door and window wall openings
	S 3.4	Cut wall openings, roof trusses, and sheeting
	S 3.5	Assemble roof for model
	S 3.6	Cover roof with shingle
	S 3.7	Apply materials to enclose exterior of model
	S 3.8	Install utilities, windows, doors, and fixtures
	S 3.9	Finish the exterior of model
	S 3.10	Landscape model for realistic appearance
	S 3.11	Build accesses and add features to model
	S 3.12	Plant shrubs and trees and judge quality
	S 3.13	Prepare speech about the architectural design
	S 3.14	Present orally important features of model home
	S 3.15	Select a home and write a contract to build
	S 3.16	Achieve recognition for work and knowledge
QUAD II		
4. Planning Residential Housing	4.1	Select site and figure land price
	4.2	Site water and sewage systems for community
	4.3	Plan single family housing development
	4.4	Determine flood protection needs and costs
	4.5	Plan street construction needs and costs
	4.6	Select school sites and figure costs
	4.7	Select site and costs for shopping centers
	4.8	Estimate cost for expanding water and sewage systems
	4.9	Plan high density housing
	4.10	Work on team to expand community facilities
	4.11	Plan construction of central business development
	4.12	Plan recreational facilities for community
	4.13	Analyze economic effects of community change
	4.14	Evaluate teams for management of community development
	4.15	Suggest solutions to community problems

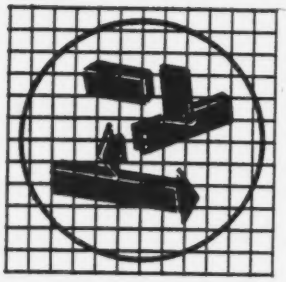
CONTENT/CONCEPT		TASK/COMPETENCIES
QUAD II		
5. Engineering and Surveying for Construction	5.1	Begin engineering cycle with preliminary ideas
	5.2	Prepare plan from ideas
	5.3	Lay out property lines
	5.4	Map topography using survey data
	5.5	Calculate cut and fill needed for site
	5.6	Build model of land shape
	5.7	Test soil to determine subsurface
	5.8	Compare soil testing samples
	5.9	Calculate design problems
	5.10	Determine grade limit for roadway design
	5.11	Build model of community site
	5.12	Select engineered design, using rating form
	5.13	Read engineering drawings
	5.14	Select a construction contract
	5.15	Complete a contract form
	5.16	Prepare a bid estimate
	5.17	Schedule work for a construction project
	5.18	Plan a school or community service project involving a model
QUAD III		
6. Preparing to Build a Structure	S 6.1	Make decisions for situations faced by contractors
	S 6.2	Saw and nail construction lumber
	S 6.3	Classify construction production practices
	S 6.4	Lay out a construction site
	S 6.5	Estimate site clearing costs
	S 6.7	Locate structure, using right angle batterboards
	S 6.8	Calculate soil volume
	S 6.9	Calculate earth moving costs
	S 6.10	Stabilize earth and structure
7. Setting Foundations for Superstructures	S 7.1	Experiment with footings
	S 7.2	Hire or apply for construction personnel position
	S 7.3	Describe advancement in construction careers
	S 7.4	Build footing forms
	S 7.5	Build column forms
	S 7.6	Set reinforcing steel in forms
	S 7.7	Establish working conditions and agreements
	S 7.8	Mix, place, and finish concrete
	S 7.9	Set block
	S 7.10	Lay brick
	S 7.11	Erect steel columns
	S 7.12	Erect steel beams
	S 7.13	Build concrete forms
	S 7.14	Describe an apprenticeship agreement
8. Building Frames for Superstructures	S 8.1	Describe framing materials and tools
	S 8.2	Build floor frames
	S 8.3.	Install bridging and subflooring
	S 8.4	Build wall frames
	S 8.5	Frame openings for window
	S 8.6	Build roof frame
	S 8.7	Inspect frame construction
	S 8.8	Solve grievances and problems
	S 8.9	Participate in mediation activities
	S 8.10	Interview industrial resource persons employed in construction careers

NOTE: S designates competencies to be included in 18-week courses.

CONSTRUCTION

CONTENT/CONCEPT		TASK/COMPETENCIES
QUAD IV		
9. Installing Utility Systems	9.1	Fabricate sheet metal duct systems
	9.2	Install ductwork in module frame
	9.3	Locate and bore holes for plumbing
	9.4	Assemble and install plumbing
	9.5	Lay out electrical wiring
	9.6	Install conduit, cable wire, switches, and outlets
	9.7	Inspect electrical and plumbing systems
10. Enclosing Exterior of Superstructure	10.1	Sheath exterior walls
	10.2	Apply roof sheathing and building felt
	10.3	Nail shingles to complete roof
	10.4	Assemble window frame
	10.5	Cover exterior walls with building felt
	10.6	Apply siding to exterior walls and gable ends
	10.7	Enclose overhang with soffit and corner board
	10.8	Install siding on exterior walls
11. Enclosing Interior of Superstructure	11.1	Insulate walls with blanket insulation
	11.2	Install gypsum board
	11.3	Tape and cement joints of gypsum board
	11.4	Install wall paneling
	11.5	Apply ceiling tiles
	11.6	Lay flooring materials
	11.7	Install window casing
	11.8	Trim baseboard with molding
	11.9	Prepare surfaces for painting
12. Finishing the Construction Project	12.1	Prepare surfaces for painting
	12.2	Paint interior and exterior
	12.3	Install electrical accessories
	12.4	Inspect the project before transferring to purchaser
	12.5	Service property as needed
	12.6	Sell construction project as AIASA enterprise project
	12.7	Salvage usable materials, using checklist
	12.8	Recycle used construction materials as AIASA enterprise project

MANUFACTURING TECHNOLOGY



Students organize and operate a manufacturing company to explore careers and work habits typical of the American industry's free enterprise system. Students make projects or products in the company, which can be sold, while experiencing the work of planners, designers, engineers, machine operators, personnel managers, and a variety of other manufacturing careers. (This course is a companion course to Construction Technology.)

PURPOSE	CODE	GRADE LEVEL	UNIT OF CREDIT	PREREQUISITES
Application and Adaptation	8425 (36 weeks) 8426 (18 weeks)	10, 11, or 12	1 maximum ½ minimum	None

SELECTED COURSE GOALS

Experiences and activities of this course will enable the student:

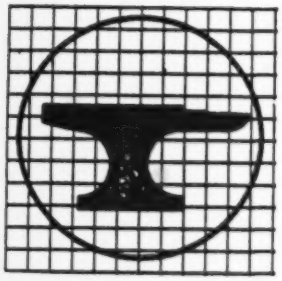
1. To describe the need for tooling in mass manufacturing
2. To identify the methods of separating, forming, machining, assembling, and finishing materials
3. To exhibit basic knowledge of career opportunities in the manufacturing industry
4. To apply measurement systems used in the manufacture of a product
5. To use a managed production system to produce a product
6. To perform the basic skills in several areas of manufacturing
7. To relate the necessity of selling, distributing, and servicing a manufactured product
8. To plan wisely before producing goods and services
9. To explain the necessity for a variety of jobs in the manufacturing industry.

MANUFACTURING TECHNOLOGY

CONTENT/CONCEPT		TASK/COMPETENCIES
1. Introducing the Manufacturing Industry	S 1.1	Explain the concept of technology
	S 1.2	Explain the evolution of manufacturing
	S 1.3	Explain the relationship of the economic system to the manufacturing system
	1.4.	Describe the broad spectrum of manufacturing technology
2. Managing the Manufacturing Organization	S 2.1	Identify and explain management stages
	S 2.2	Identify and explain the occupational levels of industrial management
	2.3	Describe the different types of organization, ownership, and profit-taking found in manufacturing enterprises
3. Researching a Product	3.1	Identify consumer demand
	S 3.2	Perform procedures associated with research and development
	S 3.3	Design a product
	S 3.4	Make a three-dimensional model
	S 3.5	Perform procedures associated with product engineering
4. Planning Production	S 4.1	Produce a prototype
	S 4.2	Plan production processes
	S 4.3	Describe production planning occupations
	4.4	Define automation in relation to manufacturing
	S 4.5	Tool up for production
	S 4.6	Construct jigs and fixtures
	S 4.7	Measure work
5. Estimating Production and Product Costs	5.1	Estimate costs of production
	5.2	Describe methods of production control
	S 5.3	Describe and implement methods of quality control
	5.4	Explain concepts associated with designing and engineering a plant
	S 5.5	Perform procedures to supply equipment and materials
	5.6	Describe data processing operations
	S 5.7	Perform selected computer operations
6. Exploring Manufacturing Personnel Technology	6.1	Explain concepts associated with personnel technology
	6.2	Design an accident prevention program
	S 6.3	Establish a mass production enterprise
7. Acquiring Raw Materials and Energy	7.1	Define and identify reproducible raw materials
	7.2	Describe procedures to extract raw materials
	7.3	Identify and describe natural energy sources
8. Processing Industrial Materials	8.1	Explain factors involved in processing industrial materials into standard stock
	S 8.2	Perform casting procedures
	S 8.3	Display skill in conditioning processes
	S 8.4	Perform separating procedures
	8.5	Display skill in conditioning process
	8.6	Demonstrate skill in machining procedures
9. Making Components and Assemblies	S 9.1	Combine components
	S 9.2	Combine subassemblies
10. Distributing and Servicing the Product	S10.1	Distribute manufactured products
	S10.2	Describe procedures associated with servicing of a manufactured product
11. Integrating the Student Organization Throughout the Course	S11.1	Participate in an organized personnel system to manage class and laboratory activities
	S11.2	Investigate community industrial and technical resources
	11.3	Participate in school (or community) improvement activities
	S11.4	Participate in a group marketing enterprise project
	11.5	Plan and participate in competitions

NOTE 1: S designates comptencies to be included in 18-week courses.

NOTE 2: Student organization activities should be integrated into the course where appropriate.



METALS TECHNOLOGY

Students use basic metalworking tools, machines, and processes to make projects of metal. They design and plan products which involve the use of lathes, welders, foundry, and sheet metal fabrication.

PURPOSE	CODE	GRADE LEVEL	UNIT OF CREDIT	PREREQUISITES
Application and Adaptation	8439 (36 weeks) 8430 (18 weeks)	10, 11, or 12	1 maximum ½ minimum	None

SELECTED COURSE GOALS

Experiences and activities of the course will enable the student:

1. To identify examples of how the metals industry directly affects the national economy
2. To identify the raw materials needed to make ferrous and nonferrous metals, their sources, and how they are transformed into usable products containing certain characteristics
3. To apply the process of heat treatment as it is used to improve plain carbon steels
4. To analyze and interpret working drawings
5. To plan for the production of a metal product or project
6. To perform safely the operations with tools and materials needed to produce a product or project of metal
7. To use decimal and metric equivalent charts
8. To exhibit orderly work habits and show consideration for fellow workers
9. To appreciate the knowledge, skills, and attitudes of personnel in various phases of metal technology

METALS TECHNOLOGY

CONTENT/CONCEPT		TASK/COMPETENCIES
1. Exploring Metals Technology and Industry	S 1.1	Identify characteristics of metalworking occupations
	S 1.2	Identify personnel management systems used in metalworking industries
2. Organizing Safety and Laboratory Management Systems	S 2.1	Identify safety equipment and rules used in the metalworking laboratory
	S 2.2	Use laboratory tools and machines safely
	S 2.3	Participate in an organized personnel system to manage class and laboratory activities
3. Participating in the Student Organization Throughout the Course	S 3.1	Participate in AIASA classroom leadership activities
	S 3.2	Investigate community industrial and technical resources related to metals technology
	3.3	Participate in school or community improvement activities
	3.4	Participate in a group marketing enterprise
4. Describing Characteristics of Metals Products	S 4.1	Identify the composition of ferrous and non-ferrous metals
	S 4.2	List the general characteristics of metals
	S 4.3	Identify common metal stock
5. Planning and Designing Metal Products	S 5.1	Select a metal product for a project
	S 5.2	Sketch proposed metal project
	S 5.3	Fill out a bill of materials
	S 5.4	Complete product plan sheet
	S 5.5	Prepare working drawings
6. Measuring and Laying Out Work	S 6.1	Identify measuring and layout tools and terms
	S 6.2	Determine size of metal stock
	S 6.3	Measure and mark stock, using English and metric systems
7. Using Metalworking Hand Tools	S 7.1	Use hand hacksaw
	S 7.2	Use cold chisels
	S 7.3	Use files
	S 7.4	Select bit and drill metal, using a hand-held drill
8. Using Sheet Metal Tools	8.1	Cut sheet metal with hand tools
	8.2	Shape sheet metal with hand tools
	8.3	Use sheet metal forming machines
	8.4	Use sheet metal bending machines
	8.5	Use sheet metal cutting machines
9. Using Fasteners and Solder	9.1	Identify threaded fasteners
	9.2	Fasten metal, using rivets
	9.3	Thread metal rod and drilled holes
	9.4	Solder metal, using appropriate fluxes and solder
10. Forming Metal	S 10.1	Cast metal with sand casting techniques
	10.2	Heat treat metals
	10.3	Bend rod and bar stock
	10.4	Forge metal
11. Welding Metal	S 11.1	Spot weld sheet metal
	11.2	Use an oxyacetylene welder
	11.3	Use an electric arc welder
12. Using Machine Tools	12.1	Use pedestal grinder
	12.2	Turn metal with metal lathe
	S 12.3	Operate drill press
13. Finishing Metal	13.1	Prepare metals for finishing
	13.2	Apply finish to metal
	13.3	Buff metal

NOTE: S designates competencies to be included in 18-week courses.

WOODS TECHNOLOGY

Students design, plan, and build wood products as they study the woodworking industry. They use both hand and power tools to develop technical skills and an understanding of manufactured products and the fundamentals of woods technology.

PURPOSE	CODE	GRADE LEVEL	UNIT OF CREDIT	PREREQUISITES
Application and Adaptation	8449 (36 weeks) 8440 (18 weeks)	10, 11, or 12	1 maximum ½ minimum	None

SELECTED COURSE GOALS

Experiences and activities of this course will enable the student:

1. To evaluate methods and processes employed by industry to produce wood products and conserve timber resources
2. To describe the apprentice and skill levels for major occupational areas in wood product processing and fabrication
3. To describe the activities of a design department in industries applying wood technology
4. To develop a plan of procedure and operation for machining and fabricating a wood product
5. To perform safely a variety of machine and tool operations for processing and shaping wood
6. To investigate and experiment with basic wood machining processes for mass production of a wood product
7. To investigate and explore the materials, processes, and products of the wood industry and its impact on society
8. To display orderly work habits and show consideration for fellow workers
9. To describe the safety measures necessary in a wood product manufacturing plant.

WOODS TECHNOLOGY

CONTENT/CONCEPT		TASK/COMPETENCIES
1. Exploring Woods Technology and Industries	S 1.1	Explore woodworking occupations
	S 1.2	Identify (establish) personnel management systems
2. Organizing Safety and Laboratory Management Systems	S 2.1	Identify safety rules and use lab tools and machines safely
	S 2.2	Participate in organized personnel system to manage class and laboratory activities
3. Using Wood Science	S 3.1	Identify wood structures
	S 3.2	Differentiate between hardwoods and softwoods
	3.3	Describe tree structure
	S 3.4	Identify wood grains
4. Using Lumber	S 4.1	Describe lumber seasoning
	S 4.2	Identify lumber defects and causes
	S 4.3	Compute board feet
5. Using Processed Woods	5.1	Describe characteristics of plywoods and veneers
	5.2	Describe characteristics of hardboard, fiberboard, and laminates
6. Planning a Project	S 6.1	Select project and list steps for making the project
	S 6.2	Make drawings
	S 6.3	Fill out bill of materials
	S 6.4	Complete project planning sheet
7. Measuring and Laying Out Work	S 7.1	Identify measuring and layout tools and terms
	S 7.2	Measure and lay out work, using English and metric systems
8. Using Hand Tools	S 8.1	Use hand saws
	S 8.2	Use hand planes
	S 8.3	Use chisels, gouges, and carving tools
	S 8.4	Use surform tools and wood files
	S 8.5	Use hand scrapers and cabinet scrapers
	S 8.6	Use hand boring tools and drilling tools
9. Using Fasteners and Cabinet Joints	S 9.1	Select and use nails and screws
	S 9.2	Select and use fasteners
	S 9.3	Identify adhesive types and uses
10. Preparing Surfaces for Finishes	S 10.1	Repair or fill surface of wood
	S 10.2	Select and use abrasives
11. Finishing Wood	11.1	Select and apply wood stains
	11.2	Select and apply paint
	S 11.3	Select and apply transparent finishes
12. Using Power Tools	S 12.1	Use scroll/jig saws
	S 12.2	Use band saw
	12.3	Use table (circular) saw
	S 12.4	Use drill press
13. Using Portable Power Tools	S 13.1	Use portable electric drills
	13.2	Use electric hand sanders
	13.3	Use saber saw
15. Integrating the Student Organization Throughout the Course	S 15.1	Participate in AIASA classroom activities
	S 15.2	Investigate community industrial and technical resources
	15.3	Participate in school (or community) improvement activities
	15.4	Participate in group marketing enterprise project
	15.5	Plan and participate in competitions

NOTE 1: S designates competencies to be included in 18-week courses.

NOTE 2: Student organization activities should be integrated into the course where appropriate.

THE STUDENT ORGANIZATION

GOAL:
LEADERSHIP/CITIZENSHIP DEVELOPMENT

The goal of the American Industrial Arts Student Association is to assist students in developing leadership qualities, high standards of quality in work, scholarship, and safety.

THE STUDENT ORGANIZATION

The Virginia Association of the American Industrial Arts Student Association (AIASA) supports students in learning to live in a technical world through an emphasis upon the following:

- Democratic principles and management practices, including both leadership and followership activities
- Involvement with the community's industrial personnel and technical resources
- Application of technical skills and information to improve school or community
- Participation in projects which emphasize the free enterprise economic system
- Exhibition of student performance, scholarship, quality in work, and safety.

AIASA activities in the elementary school are provided as an extracurricular function. The middle or junior high and high school programs include AIASA within the instructional activities.

STANDARDS

To accomplish its purpose, the AIASA chapter in the secondary school shall provide:

- Integrated Activities: Chapter activities are an integral part of the instructional program and are supervised by Technology Education personnel.
- Community Resources: Students have opportunities to interact with members of the industrial community and to use the community's technical resources.
- Participatory Democracy: Chapter activities include experiences in parliamentary procedures and democratic decision making.
- Recognition of Achievement: Chapter events give students opportunities for recognition of outstanding performance, scholarship, quality in work, and safety.

RESOURCES
FOR
TECHNOLOGY EDUCATION

GUIDES AND RESOURCES FOR THE STUDENT ORGANIZATION

AIASA Guides

AIASA Guide 1: Organizing the Industrial Arts Student Association. 1980. Explains how to establish and operate an AIASA chapter.

AIASA Guide 2: Student Association Activities in Industrial Arts Instruction. 1979. Illustrates how to use AIASA activities as teaching tools.

AIASA Guide 3: Advisor's Handbook. 1981. Includes sections on leadership development, meeting procedures, committees, and conference participation.

AIASA Guide 4: Officer's Handbook. 1981. Includes sections on leadership development, meeting procedures, committees, and conference participation.

AIASA Guide 5: Annual Program of AIASA Activities. 1981. Identifies the basic activities necessary to have an AIASA chapter serve members and achieve goals. Explains regional and local activities.

AIASA Guide 6: Standards for AIASA Events. 1982. Identifies permanent rules for AIASA Regional Fairs and the Industrial Arts Spring Festival.

Audiovisual Materials

Contact AIASA Specialist or Regional State Supervisor for these materials:

Art of Communication: How to Conduct a Meeting. State film #21908.

Organizing the Industrial Arts Student Association. Slide/tape program.

Move With Tomorrow. Slide/tape program (activities from class to conference).

Organizing the Industrial Arts Student Association. Transparencies in back of Guide 1.

In-Class AIASA Management. ETV tape, 3/4".

AIASA--A Classroom Experience. National AIASA slide tape program.

Introducing AIASA. National AIASA transparency masters.

TEXTBOOKS AND TEACHER RESOURCES FOR TECHNOLOGY EDUCATION COURSES

EXPLORING TECHNOLOGY

Textbooks

Groneman and Feirer. General Industrial Education and Technology. New York: McGraw-Hill, 1986.

Lindbeck and Lathrop. General Industry. Peoria, Ill.: Bennett, 1977.

Miller, et al. Basic Industrial Arts. Bloomington, Ill.: McKnight, 1978.

Pierson and Richards. Industrial Arts Skills, Tools, Careers. Chicago: Benefic Press, 1979.

Bame and Cummings. Exploring Technology. Worcester, Mass.: Davis, 1980.

Teacher Resources

Technology Education Service. Exploring Technology Instructional Resource Guide. Richmond: Virginia Department of Education, 1983.

Maley. The Maryland Plan. New York: Bruce, 1973.

Heiner and Hendrix. People Create Technology. Worcester, Mass.: Davis, 1980.

INDUSTRY AND ENTERPRISE

Textbooks

Groneman and Feirer. General Industrial Education and Technology. New York: McGraw-Hill, 1986.

Lindbeck and Lathrop. General Industry and Technology. Peoria, Ill.: Bennett/McKnight, 1986.

Teacher Resources

Technology Education Service. Instructional Tasks/Competencies for Modern Industry. Bloomington, Ill.: McKnight, 1971.

BASIC TECHNICAL DRAWING

Textbooks

Spencer and Dygdon. Basic Technical Drawing. New York: Macmillan, 1970.

French, et al. Mechanical Drawing. New York: McGraw-Hill, 1985.

Rotmans, et al. Basic Drafting Technology. Albany, N.Y.: Delmar, 1980.

Spence. Basic Industrial Drafting. Peoria, Ill.: Bennett, 1974.

TEACHER RESOURCES

Technology Education Service. Basic Technical and Engineering Drawing Instructional Resource Guide. Richmond: Virginia Department of Education, 1983.

ENGINEERING DRAWING

Textbooks

French, Suensen, et al. Mechanical Drawing. New York: McGraw-Hill, 1980.

Brown. Drafting for Industry. South Holland, Ill.: Goodheart-Willcox, 1978.

Teacher Resources

Technology Education Service. Basic Technical and Engineering Drawing Instructional Resource Guide. Richmond: Virginia Department of education, 1983.

ARCHITECTURAL DRAWING

Textbooks

Helper and Wallach. Architecture Drafting and Design. New York: McGraw-Hill, 1977.

Spence. Architecture. Bloomington, Ill.: McKnight, 1979.

Kicklighter and Baird, Architecture: Residential Drawing and Design. South Holland, Ill.: Goodheart-Willcox, 1983.

Teacher Resources

Technology Education Service. Architectural Drawing Instructional Resource Guide. Richmond: Virginia Department of Education, 1984.

COMMUNICATION TECHNOLOGY

Textbooks

French, et al. Mechanical Drawing. New York: McGraw-Hill, 1980.

Broekhuizen. Graphic Communications. Bloomington, Ill.: McKnight, 1979.

Jones and Robb. Discovering Technology Communication. Saddle Brook, N.J.: Harcourt Brace Jovanovich, 1985.

Teacher Resources

Technology Education Service. Instructional Tasks/Competencies for Communication Technology. Richmond: Virginia Department of Education, 1985.

Duvall and Berger. Getting the Message: The Technology of Communication. Worcester, Mass.: Davis, 1981.

GRAPHIC COMMUNICATIONS

Textbooks

Cagoli. Photo Offset Fundamentals. Bloomington, Ill.: McKnight, 1974.

Karch. Graphic Arts Procedures. Chicago: American Technical Society, 1976.

Broekhuizen. Graphic Communications. Bloomington, Ill.: McKnight, 1979.

Walker. Graphic Arts Fundamentals. South Holland, Ill.: Goodheart-Willcox, 1983.

Dennis and Jenkins. Comprehensive Graphic Arts. Indianapolis: Bobbs-Merrill, 1983.

Teacher Resources

Technology Education Service. Instructional Tasks/Competencies for Graphic Communications. Richmond: Virginia Department of Education, 1985.

ELECTRICITY/ELECTRONICS TECHNOLOGY

Textbooks

Buban and Schmitt. Understanding Electricity and Electronics. New York: McGraw-Hill, 1977.

Gerrish and Dugger. Electricity and Electronics. South Holland, Ill.: Goodheart-Willcox, 1980.

Loper, et al. Introduction to Electricity and Electronics. Albany, N.Y.: Delmar, 1979.

Gerrish and Dugger. Transistor Electronics. South Holland, Ill.: Goodheart-Willcox, 1981.

Teacher Resources

Technology Education Service. Electricity/Electronics Instructional Resource Guide. Richmond: Virginia Department of Education, 1984.

CONSTRUCTION

Textbooks

Lux and Ray. The World of Construction (Textbook and Lab Manual). Bloomington, Ill.: McKnight, 1982.

Betts, et al. Exploring the Construction Industry. Bloomington, Ill.: McKnight, 1976.

Henak. Exploring Construction. South Holland, Ill.: Goodheart-Willcox, 1985.

Teacher Resources

Lux and Ray. The World of Construction (Teacher's Guide). Bloomington, Ill.: McKnight, 1982.

MANUFACTURING

Textbooks

Lux and Ray. The World of Manufacturing (Textbook and Lab Manual). Bloomington, Ill.: McKnight, 1971.

Fales, et al. Manufacturing: A Basic Text for Industrial Arts. Bloomington, Ill.: McKnight, 1980.

Fales, et al. Activity Book--Manufacturing: A Basic Text for Industrial Arts. Bloomington, Ill.: McKnight, 1980.

Wright and Jensen. Manufacturing Technology. South Holland, Ill.: Goodheart-Willcox, 1985.

Teacher Resources

Lux and Ray. The World of Manufacturing (Teacher's Guide). Bloomington, Ill.: McKnight, 1971.

Fales, et al. Instructor's Guide--Manufacturing: A Basic Text for Industrial Arts. Bloomington, Ill.: McKnight, 1980.

Lindbeck. Designing Today's Manufactured Products. Bloomington, Ill.: McKnight, 1972.

MATERIALS AND PROCESSES TECHNOLOGY

Textbooks

Kazanas, et al. Technology of Industrial Materials. Peoria, Ill.: Bennet, 1974.

Teacher Resources

Technology Education Service. Materials and Processes Technology. (Curriculum Guide). Richmond: Virginia Department of Education, 1980.

Technology Education Service. Instructional Tasks/Competencies for Materials and Processes Technology. Richmond: Virginia Department of Education, 1986 (projected).

Jacobs and Kilduff. Engineering Materials Technology. Englewood Cliffs, N.J.: Prentice-Hall, 1985.

METALS TECHNOLOGY

Textbooks

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